PRINTRONIX®

User's Reference Manual

P3000 Series Multifunction Printer

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PRINTRONIX®

P/N 112392–001, Rev B

US and CANADA Radio Interference Note

Note: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. The manufacturer is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

The input/output (I/O) cable must be shielded for the printer to comply with FCC rules and regulations Part 15 governing the radiation limits for Class "A" equipment.

This Class A digital apparatus meets all requirements of the Canadian Interference–Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

WARNING

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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About This Manual

This manual was written with you in mind. It contains all the information you need for trouble–free printer operation, and is designed for fast and easy use. The comprehensive Table of Contents is augmented by chapter contents listings on the first page of each chapter and a detailed index at the back of the book. Supplemental and reference information is charted in four appendices. The chapters provide introductory information, installation instructions, complete operating information, graphics data, Vertical Format Unit data, control code information for programmers, maintenance procedures, and interface descriptions.

WARNING, CAUTION, IMPORTANT, and *NOTE*

Information requiring special attention is highlighted under special headings. Always read and comply with this information. The heading reveals the nature of the information:

❑ WARNING ❑

WARNING tells you of conditions that could cause you physical harm.

❑ CAUTION ❑

CAUTION tells you of conditions that could damage the printer or related equipment.

❑ IMPORTANT ❑

IMPORTANT gives you information vital to proper operation of the printer.

NOTE: Provides information affecting printer operation considered important enough to emphasize.

Switches and Indicators

Switches, indicators, and switch positions are printed as they appear on the printer — in uppercase letters. For example, “Set the power switch to the ON (|) position.”

Controls and indicators without identification labels are assigned functional names printed with the first letter of each word capitalized. For example, “Raise the Forms Thickness Adjustment Lever to the fully open position.”

CHAPTER 1

OVERVIEW

Introduction

The *Printronix* P3000 Series Multinational printers are quiet, full–featured, multifunction line printers. In addition to the basic *Printronix* P–Series printer functions, the P3000 Series includes correspondence quality print for near–letter–quality (NLQ) printing requirements, high–speed printing, and character–by–character attributes for wide application compatibility.

The P–3000 Series family of printers consists of the P3040 and P3040–12 pedestal model printers and the P3240 floor cabinet model printer. The P3040–12 pedestal model differs from the standard P3040 by providing a quick access cover for easy printout retrieval, and a smaller, .012–inch hammer tip to produce very fine bar code print quality. All three printers are identical in function and operation. The P3040 is the pedestal model illustrated throughout this manual.

This chapter presents an overview of the printer:

Features

P3000 Series Multinational printers provide the following standard features:

- P–Series and Serial Matrix emulation protocols
- P–Series Plot and Bit Image compatible graphics
- By–Character attributes:
  - Selectable pitch
  - Bold print
  - Emphasized (shadow) print
  - Expanded (double wide) print
  - Elongated (double high) print
  - Automatic underline and overscore
  - Superscript/subscript print
- Selectable forms length
- Electronic vertical formatting
  - Standard *Printronix* Electronic Vertical Format Unit (EVFU)
  - Direct Access Vertical Format Unit (DVFU)
  - Serial Matrix compatible vertical formatting
- Resident multinational character sets, including OCR–A and OCR–B
- Selectable 13.2” or 13.6” print widths
- Built–in diagnostic self–tests
- Configuration printout
- Data stream hex code printout
- Resident serial and parallel interfaces
- Downloadable international languages

Two separate graphics capabilities are included in the printer: standard P–Series odd–even dot Plot Mode graphics and Bit Image graphics standard on *Printronix* MVP 150B printers and many serial matrix printers. Intelligent graphics capabilities are available by using the *Printronix* Intelligent Graphics Processor (IGP) options.

Serial Matrix compatibility extends printer versatility, enabling it to be used with a wide variety of applications software. You may select industry standard *Printronix* P–Series or Serial Matrix compatibility (similar to the IBM Graphic Printer) from the control panel.

The programmable Vertical Format Unit provides rapid paper advance to specified lines for printing repetitive and continuous forms. When P–Series compatible protocol is used, you can select either the P–Series compatible EVFU or Dataproducts compatible DVFU. Serial Matrix compatible vertical formatting is used in Serial Matrix protocol.

International languages can be selected and downloaded. International languages can be added to the character library and are accessible in P–Series and Serial Matrix printer protocol.

Optional Features

P3000 Series Multinational printer capability and versatility can be enhanced with the options listed below. For more information, contact an authorized *Printronix* representative.

- **Intelligent Graphics Processor (IGP®)** – Allows you to create and store forms, generate logos, bar codes, expanded characters, and other graphics. Forms can be created with a variety of graphic components and overlayed with alphanumeric and bar code data in a single pass. Available as a factory–installed or field–installed option. The IGP is a standard feature for the P3040–12.
- **IBM® Interfaces** – Allows P3000 Series printers to attach to coax (PI–3287) or twinax (PI–5225) systems. Available as a factory–installed or field–installed option.
- **Special Paint/Labeling** – Offers custom cabinet colors or special labels (company logos, labels,etc.). Available as a factory–installed option.
- **Maintenance Manual** – Covers Theory of Operation, Cleaning, Corrective Maintenance, Troubleshooting, and Illustrated Parts Breakdown.
- **Quick Access Cover –** For easy printout retrieval. Available on pedestal models only. This feature is standard for the P3040–12.

Character Formation

The printer generates characters by assembling groups of dots in matrices. Dots overlap to produce a solid appearing character of uniform density as shown in Figure 1–1. Dot impressions are made by an assembly of hammers installed on an oscillating shuttle. P3000 Series printers have 34 hammers. The hammers impact the paper through a moving ink ribbon. Horizontal shuttle movement and vertical paper advancement combine for precise dot printing to form the character matrix.

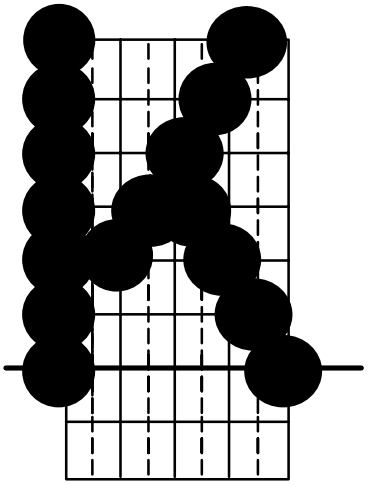


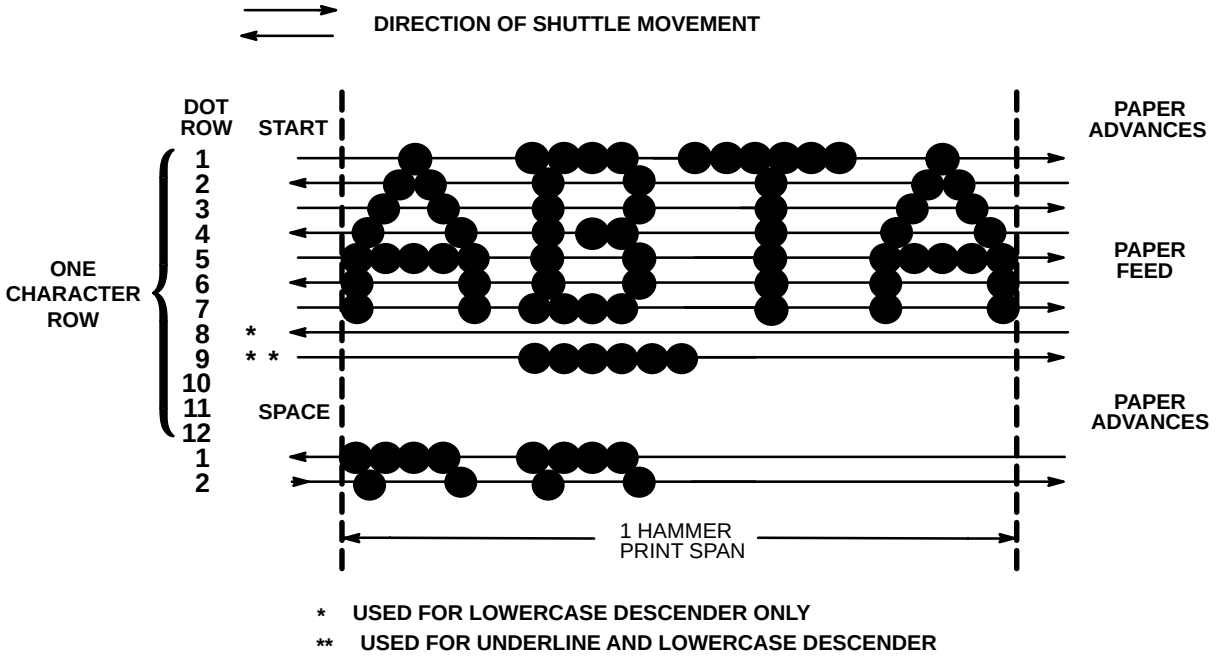
Figure 1–1. Typical Character Formation

Line Matrix Printing

Unlike moving–head dot matrix printers, *Printronix* P3000 Series printers create graphics and characters by printing an entire dot row at one time. As shown in Figure 1–2, dots are printed in both directions of shuttle travel at a printer stroke length of .4 inches to print through several character positions in 10 pitch Data Processing print mode. By printing a row of dots, line matrix printers achieve higher print duty cycles than moving head dot matrix (serial) printers.

During each sweep of the shuttle, hammers are activated to print dots at selected positions in that dot row. When the shuttle reaches the end of a sweep, it reverses direction, paper advances one dot row, and the hammers print the next consecutive row of dots.

After an entire line of characters is printed, hammer print action ceases and the paper advances to the first dot row of the next print line. This creates a series of blank rows between lines of characters. The number of rows allowed for line separation depends on the line spacing selected. Line spacing may be selected from the control panel or the host computer.



NOTE: P3000 shuttle sweeps through 4 character spaces at 10 cpi.

Figure 1–2. Line Matrix Printing

Print Rate

The print rate, in lines per minute (lpm), is a function of the number of dot rows required to produce the character line regardless of the number of characters in the line. For example, more dot rows are required to print lowercase characters with descenders; consequently, those characters are printed at a slower rate. Table 1–1 describes the print rate according to type of character printed and print mode. Complete printing specifications are provided in Appendix C.

Table 1–1. P3000 Series Print Rates

Print Mode	Uppercase Only	Upper/Lowercase
Data Processing (DP)	300	240
Correspondence (NLQ)	175	134
High Speed (HS)	400	350
Barcode 145	267	214
Barcode 160	250	200

Plot Rate

As well as character printing, the P3000 Series printers are capable of dot–addressable graphic plotting. Based on the protocol selected, either P–Series Plot Mode or Serial Matrix Bit Image Graphics is used; the plot rate specifications apply to both P–Series and Serial Matrix types of graphic plotting. The bidirectional plot rate (in inches per minute, “ipm”) is described in Table 1–2 according to the dot density (in dots per inch, “dpi”). Complete plotting specifications are provided in Appendix C.

Table 1–2. Plot Rates

Density (dpi)	P3000 Plot Rates (ipm)
60 Horiz x 72 Vert (DP mode)	33
90 Horiz x 96 Vert (NLQ mode)	18
60 Horiz x 48 Vert (HS mode)	50
72.5 Horiz x 72 Vert (Barcode 145 mode)	15
80 Horiz x 72 Vert (Barcode 160 mode)	14

NOTE: Unidirectional plotting produces better print quality than bidirectional, and can be selected from the control panel; however, unidirectional plot reduces the plot rate to half.

CHAPTER 2

OPERATION

Introduction

This chapter describes P3000 Series controls and operating procedures. The following information is discussed in this chapter:

Basic Operation Features

On Line

The printer functions either “on line” or “off line.” When on line, the printer is capable of receiving data and control commands from the host computer. The message display on the printer control panel indicates that the printer is on line and shows the current print mode.

Off Line

When the printer is off line, communication between the printer and the host computer is temporarily stopped and the message OFFLINE READY appears on the display. Set the printer off line to perform the following tasks:

- Display/Change Configuration Values
- Run the Self–Test
- Set Top–of–Form
- Enter Hex Dump Mode
- Set Line Spacing
- Load Paper and Ribbon
- Advance to Top of Form
- Change Print Modes
- Adjust Paper Tractors
- Advance Paper

Command Sets (Protocol Modes)

The P3000 Series Multinational printers respond to two different command sets (protocols): P–Series and Serial Matrix.

The protocol is selected from the control panel and must correspond with the programming standard used by the host computer to communicate with the printer. You can select either protocol as required by the application. The P–Series emulation mode generates characters and graphics using *Printronix* standard P–Series control code protocol. The Serial Matrix emulation mode generates characters and graphics using Serial Matrix control code protocol similar to the IBM Graphics Printer. Refer to the Programming chapter for detailed information on P–Series and Serial Matrix protocols and control code definitions.

Character Set Options

Four basic character set choices are selectable from the control panel: IBM PC, Multinational, ECMA–94 Latin 1, and DEC Multinational. Within each character set, specify the desired specific foreign language set.

You can also define and download a custom character substitution table to replace any symbol residing in the character library (see page 6–31). This downloading feature is discussed in more detail in the Programming chapter.

Power Switch

On pedestal model printers (P3040 and P3040–12), the AC power switch is located on the rear panel of the printer. The floor cabinet model (P3240) power switch is located at the lower left corner of the rear panel. (Refer to Figure 2–1.) To turn the printer power on, set the power switch to the ON (|) position.

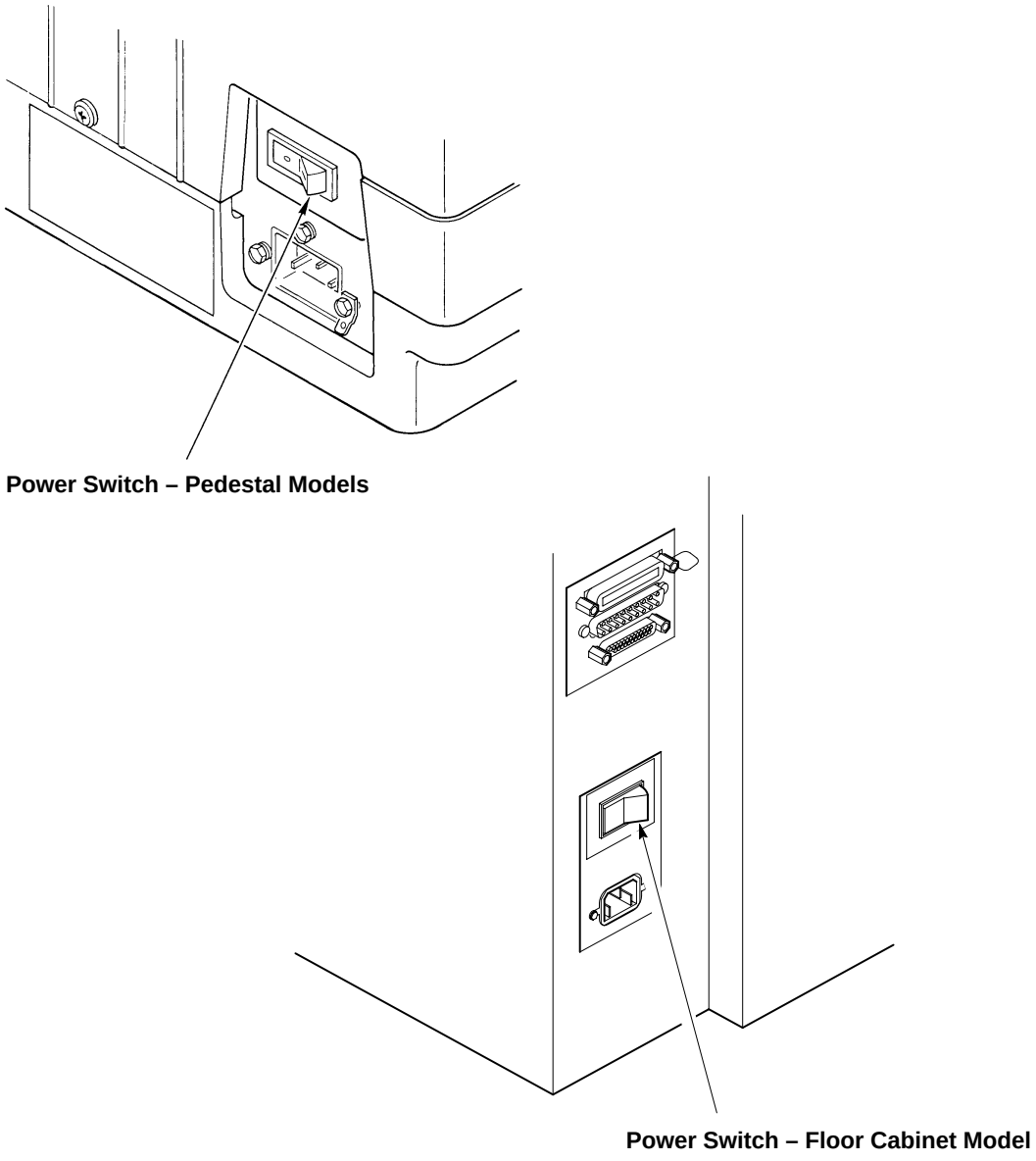


Figure 2–1. Power Switch

Control Panel Switches and Indicators

The printer control panels contain twelve momentary–contact switches (16 switches if the printer has the PI–3287 option), four Light–Emitting Diode (LED) indicators (eight if the printer has the PI–3287 option), and a 32–character alphanumeric Message Display, as shown in Figure 2–2. The eight configuration function switches on the Display control panel are accessible only when the printer cover is raised. These switches and indicators are described on the following pages.

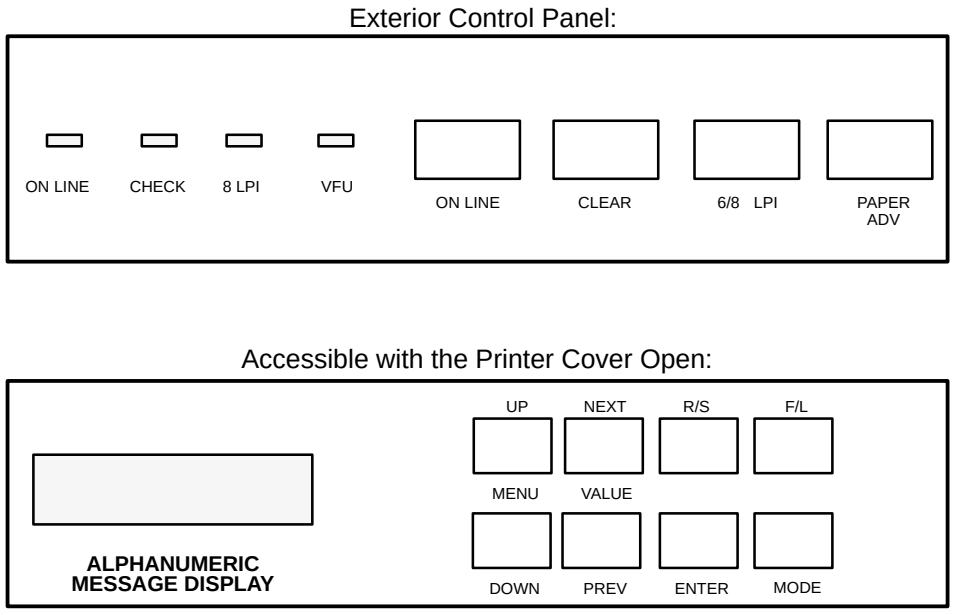


Figure 2–2. Control Panel

Alphanumeric Message Display

The Message Display shows printer status, operator selections, and fault condition messages. The display has two rows with sixteen characters per row. During normal operation, the display indicates the on line status and the current print mode (and pitch) selection. When off line, the display reads OFFLINE READY or OFFLINE DATA IN BUFFER.

ON LINE Switch

Press this switch to place the printer alternately on line or off line. When the printer is on line, the ON LINE LED lights. The printer must be on line to receive data from the host computer. When the printer is on line, the display indicates the current print mode, and only the PAPER ADV control panel switch functions. When the printer is off line, the display reads OFFLINE READY. All switches are active (except the ENTER switch unless it has been unlocked), and the printer cannot communicate with the host computer. The printer must be off line to change printing format or configuration and goes off line automatically if a fault occurs.

If the display shows OFFLINE HEX DUMP (a diagnostic selection), pressing the ON LINE switch causes the printer to go on line, and data from the host computer is printed in "hex dump" format. The display shows ON LINE HEX DUMP. Pressing the ON LINE switch again takes the printer back to the OFFLINE HEX DUMP state.

CLEAR Switch and CHECK Indicator

If a fault condition occurs, a fault message appears on the Message Display, and the CHECK indicator flashes alternately with the ON LINE indicator. After you correct the fault condition, press the CLEAR switch. The fault status will be validated and the display updated. If all faults were corrected, the display will indicate the printer is off line.

In addition, the CLEAR switch has the special functions noted below. Except when used to reset the printer (#1 below), the CLEAR switch operates only when the printer is off line.

1. Simultaneously pressing CLEAR and R/S (RUN/STOP) resets the printer. You may reset the printer at any time, on line, off line, or while printing. However, it is recommended that you reset the printer only when it is off line and no data is in the buffer, or loss of data may result.

2. CLEAR is used with the PAPER ADV switch to set top–of–form. (Refer to Setting the Top–of–Form section on page 2–12.)

3. Pressing CLEAR when one of the configuration parameter values is displayed places the printer back to off line status. Refer to the Control Panel Configuration Diagram in the Configuration chapter.

4. Pressing CLEAR silences the audio alarm during a fault condition.

6/8 LPI Switch

Press this switch to display the current line spacing in lines per inch (lpi). Subsequently pressing this switch steps the selection through 6, 8 and 10.3 (7/72") lpi. Use of the ENTER switch is not required to select the line spacing. The LED next to this switch lights when line spacing is *other* than 6 lpi. The 6/8 LPI switch functions only when the printer is off line.

> *NOTE: Line spacing control from the host computer overrides the switch setting. Control codes from the host computer can select line spacing other than the 6, 8, or 10.3 lpi and is reflected on the message display.*

PAPER ADV Switch

Momentarily press this switch to advance the paper one line, or press and hold the switch to advance to the top–of–form of the next page. This switch can be configured to advance the paper only after printing any data remaining in the buffer, or to move paper without printing. (Refer to the Configuration chapter.) When the printer is on line, press the PAPER ADV switch to advance to the next top–of–form. However, if there is any data in the buffer, no paper motion occurs and the message ON LINE DATA IN BUFFER momentarily displays.

> *NOTE: If the Paper Advance Switch is configured for Move Paper Only and data from the host does not end in a paper motion command, the last line of text will print on the first line of the next page.*

The PAPER ADV switch is also used to set top–of–form. (Refer to Setting Top–of–Form section on page 2–12.)

VFU LOADED Indicator

This LED indicator lights when the form (paper) format is being controlled by the Vertical Format Unit. (Refer to the Configuration and VFU chapters.) When the appropriate VFU is selected by the operator and loaded by the host computer, this indicator lights.

ENABLE/HOLD, PA1 REPRINT, PA2 CANCEL, ALT MODE (Optional Switches)

These four switches and their associated LEDs are included on printers equipped with a *Printronix* PI–3287 printer interface and operate independently of all other control panel switches. The PI–3287 enables a *Printronix* printer to emulate an IBM 3287 printer; the printer may then be used with an IBM 3274 or 3276 control unit. Information on the operation and function of these switches is contained in the PI–3287 User's Reference Manual. If the printer is not configured to emulate an IBM 3287 printer, these switches are not provided.

THE SWITCHES DESCRIBED BELOW ARE ACCESSED BY RAISING THE PRINTER COVER:

MENU UP, MENU DOWN, NEXT, and PREV Switches

To make configuration changes, the ENTER switch must be unlocked. When the printer is OFFLINE READY, simultaneously pressing MENU UP and MENU DOWN alternately locks and unlocks the ENTER switch. No other switches are affected by this action. Use the MENU UP, MENU DOWN, NEXT, and PREV switches to display configuration parameter main menus, submenus, and certain diagnostic tests. After the required menu displays, use the NEXT and PREV switches (shown on the Control Panel Configuration Diagram in the Configuration chapter) to display individual parameters. The value shown on the display with an asterisk (*) is the current parameter value retained in printer memory.

NOTE: When the printer is off line, configuration menus and parameter values may be viewed at any time. To make any configuration changes, you must first unlock the ENTER switch from the OFFLINE READY display. The ENTER switch cannot be unlocked or locked from within a menu. Pressing ENTER loads a displayed configuration value into printer working memory. However, these configuration changes will be lost when the printer is powered down unless saved. Be sure to relock the configuration after you have made your changes.

R/S Switch

R/S (Run/Stop) performs the following functions:

- Press R/S simultaneously with CLEAR to reset the printer.
- If a diagnostic test is selected and shown on the display, press R/S to start the test and press it again to stop the test.
- If the CONFIGURATION PRINTOUT message is selected and shown on the display, press R/S to print a list of the current configuration.

ENTER Switch

Press ENTER to enter a displayed parameter value into printer working memory. The previous value is replaced by the displayed value. The ENTER switch must be used to alter a menu selection and those parameters displayed using the MODE and F/L switches. (Functions activated by the R/S and 6/8 LPI switches do not use the ENTER switch.)

The ENTER switch must be enabled (unlocked) before making configuration or format changes. Simultaneously pressing MENU UP and MENU DOWN alternately locks and unlocks the ENTER switch. (This sequence protects against accidental reconfiguration.) No other switches are affected by this action. The ENTER switch can only be locked or unlocked when the display shows OFFLINE (and there is no data in the buffer), after which the display reads either ENTER SWITCH NOT LOCKED or ENTER SWITCH LOCKED for approximately one second. The display then returns to OFFLINE. Resetting the printer or turning the power off and on will relock the ENTER switch.

MODE Switch

The print MODE switch functions only when the printer is off line. Press this switch to display the current print mode. Subsequently pressing the NEXT VALUE, PREV VALUE, or MODE switches updates the Message Display through all of the available print modes listed below. Print mode is selected with the ENTER switch.

- High Speed (HS) at 10, 12, 13.3, 15, and 17.1 cpi
- Data Processing (DP) at 10, 12, 13.3, 15, and 17.1 cpi
- Correspondence (NLQ) at 10, 12, and 15 cpi
- OCR–A at 10 cpi
- OCR–B at 10 cpi

- Barcode 145 at 12.1 cpi
- Barcode 160 at 13.3 cpi

NOTE: Print mode control from the host computer overrides the control panel setting.

F/L Switch

The F/L (Forms Length switch functions only with the printer off line. Press F/L to enter the Forms Length menus.

You can select Forms Length in inches or lines via printer configuration. Refer to the Setting Forms Length section on page 2–15.

You can also set Forms Length by control code from the host computer. Forms length control from the host computer overrides the control panel setting. Refer to the Programming chapter for details.

Loading Paper

The printer uses standard fanfold paper from 3 to 16 inches wide (perforation to perforation) and 15 to 100 lb. bond (0.025 inches thick maximum). To load paper, perform the following steps and refer to Figure 2–3.

1. Place the printer off line and raise the printer cover.
2. Fully raise the Forms Thickness Adjustment Lever (A).
3. Open both tractor gates (B**)** by swinging them out.
4. Feed the paper up through the paper slot at the base of the printer. (In floor cabinet models, open the front printer door and align the paper supply with the position of the tractor sprockets (D). Feed the paper up through the paper slot until it appears above the ribbon mask (C). If the paper snags, fold the top edge down before feeding.
5. Load the paper on the tractor sprockets (D); close the tractor gates (B). If necessary, slide the right tractor to remove paper slack or to adjust for various paper widths by releasing the right tractor lock (E) by raising or lowering it to the center; slide the tractor into position. After positioning the tractor, lock it in place.

   NOTE: Lock the left tractor in alignment with the number "1" on the paper scale to set the left margin with the first character space.

6. Continue to feed the paper through the paper path at the top of the cabinet (F).
7. For printers with a Quick Access cover, close the printer cover. Open the plastic Quick Access cover by pulling the Quick Access lever located on the right side of the printer. Feed the paper through the clear plastic Quick Access cover.
8. Press PAPER ADV to advance paper into the paper stacking area. Verify unobstructed paper feeding.
9. Set the Forms Thickness Adjustment Lever (A) with slight friction to approximate the paper thickness. The A–B–C scale indicates relative positioning to correspond approximately with 1– to 6–part paper thicknesses. (If closed too tightly, the shuttle may stall or tear the paper.)
10. Set the top–of–form as described in the Setting Top–of–Form procedure on page 2–12.
11. Close the printer cover.
12. Press CLEAR and place the printer on line.

    NOTE: The P3040 is the pedestal model illustrated throughout this manual.

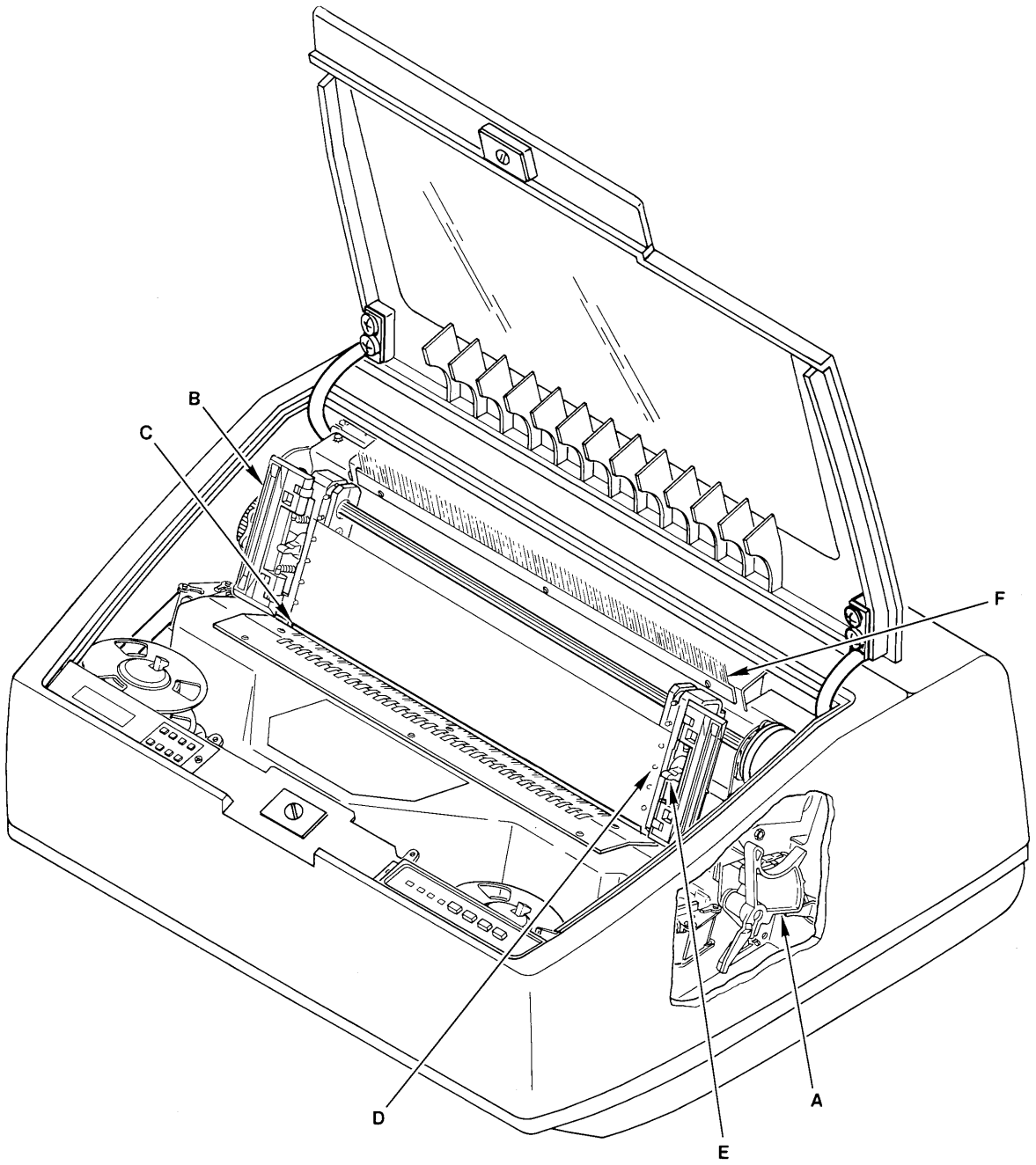


Figure 2–3. Loading Paper

Unloading Paper

1. Place the printer off line.
2. Tear off the paper at the slot at the bottom of the printer.
3. Fully raise the Forms Thickness Adjustment Lever.
4. Open both tractor gates and remove the paper from the tractor sprockets.
5. Gently pull the paper up through the paper slot. Be careful not to let paper perforations or sprocket holes catch on the ribbon mask.

Replacing the Ribbon

Each printer is shipped with a standard black ink, one–inch nylon fabric ribbon on two spools. OCR (extra dark) ribbons are also available. Replace the ribbon when the print contrast is too light or approximately after each box of standard size computer paper. To replace the ribbon, perform the following steps and refer to Figure 2–4.

1. Place the printer off line and raise the top cover.
2. Fully raise the Forms Thickness Adjustment Lever (A) to open the platen. (To disable the audio alarm, press the CLEAR switch.)
3. Unlatch the ribbon spools (B) and carefully lift them off the hubs (C). Raise the ribbon out of the ribbon path. Discard the used ribbon.
4. Place each new ribbon spool (B**)** on a hub (C) with the ribbon to the outside. Either ribbon spool can be loaded on either hub.
5. Press the spools down until the latch (D**)** snaps in place.
6. Thread the ribbon around the two ribbon guides (E) and through the ribbon path as shown in the diagram (F) on the ribbon deck cover. The ribbon must pass between the two thin metallic strips called the hammer bank cover (G**)** and the ribbon mask (H). Manually turn the ribbon spools to ensure that the ribbon is tracking correctly in the ribbon path.

❑ CAUTION ❑

The ribbon must not be twisted. A twisted ribbon can lower print quality, shorten ribbon life, or cause paper jams.

❑ VORSICHT ❑

Das Farbband darf nicht verdreht sein. Ein verdrehtes Farbband kann die Druckqualität und die Farbbandlebensdauer erniedrigen, oder könnte Papiertransportfehler hervorrufen.

7. Lower the Forms Thickness Adjustment Lever (A) to the appropriate operating position.

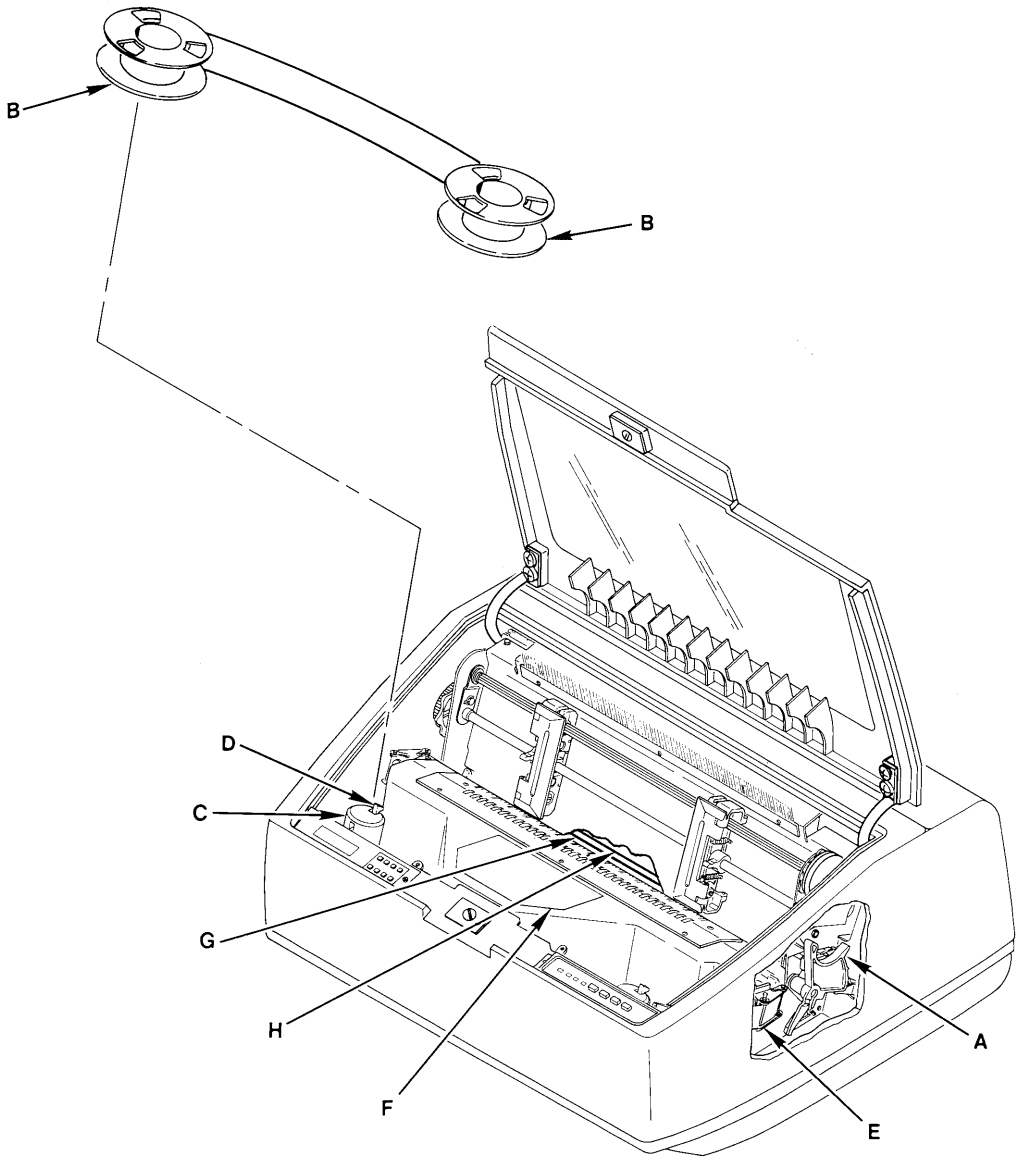


Figure 2–4. Ribbon Replacement

8. Press CLEAR (on the control panel) to clear the PLATEN OPEN fault condition.
9. Close the top cover and place the printer on line.

Setting Top–Of–Form

Top–of–form determines where the first line of print will appear and is set when paper is loaded. Typically, the first line of print is set approximately one–half inch below the paper perforation unless specific application requirements dictate otherwise.

Once top–of–form has been set, press and hold the PAPER ADV switch to advance to the top of the next form. Unless otherwise configured, the printer assumes 11–inch length paper is used. For alternate length forms, refer to Setting Forms Length on page 2–15.

There are two methods of setting top–of–form. The first method uses *forward* paper motion and is performed with the Forms Thickness Adjustment Lever closed. The second method uses *reverse* paper motion and is performed with the Forms Thickness Adjustment Lever open.

Use the reverse paper motion method when the forms length setting in the printer is different from the actual forms length set (for example, when the host sets the forms length for non–standard length forms). The reverse paper motion method of setting top–of–form reverse feeds the paper backward a fixed number of inches and does not use the forms length currently set in the printer.

NOTE: Do not use the reverse paper motion method of setting top–of–form for heavy forms or peel–off label forms.

Setting Top–of–Form – Forward Paper Motion

1. Place the printer off line and raise the printer cover.
2. Move the Forms Thickness Adjustment Lever to the fully open position. (The CHECK indicator lights, the status lamps flash alternately, and FAULT CONDITION PLATEN OPEN displays.)
3. Rotate the Vertical Position Knob (on the right side of the printer) to align the first print line with the top–of–form alignment notch on the left tractor gate (A, Figure 2–5).
4. Close the Forms Thickness Adjustment Lever to the appropriate paper thickness position.
5. Press and release the CLEAR and PAPER ADV switches *simultaneously.* The paper advances to the top–of–form position on the next form. The display reads OFFLINE/TOP OF FORM SET.
6. Close the printer cover and place the printer on line.

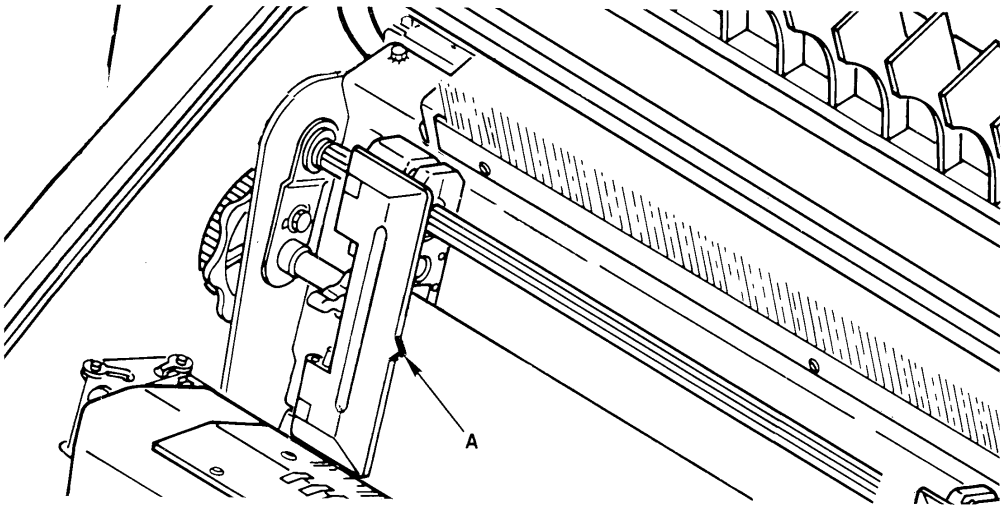


Figure 2–5. Setting Top–of–Form

Setting Top–of–Form – Reverse Paper Motion

NOTE: Do not use this method of setting top–of–form for heavy forms or peel–off label forms.

1. Place the printer off line and raise the printer cover.
2. Move the Forms Thickness Adjustment Lever to the fully open position. (The CHECK indicator lights, the status lamps flash alternately, and FAULT CONDITION PLATEN OPEN display.)
3. Rotate the Vertical Position Knob (on the right side of the printer) to align the first print line with the top–of–form alignment indicator on the left tractor gate (Figure 2–5).

NOTE: Be sure there is enough paper extending through the tractor area so that forms do not run out of the tractors during the reverse feed in the following step.

4. Press and release the CLEAR and PAPER ADV switches *simultaneously.* The paper reverses feed to the top–of–form position on the *current* form.
5. Close the Forms Thickness Adjustment Lever to the appropriate paper thickness position.
6. Press the CLEAR switch to clear the PLATEN OPEN fault condition.
7. Close the printer cover and place the printer on line.

Paper Stacking (Floor Cabinet Model)

NOTE: The following paper stacking instructions pertain to the floor cabinet model printer only. For pedestal models, refer to the paper stacking instructions accompanying your paper basket/stacking kit.

The floor cabinet model printer can stack at least half a box of standard computer paper when the paper is properly loaded. After loading the paper, perform the following steps.

1. Open the rear cabinet door to access the paper stacking area.
2. Advance the paper until a few sheets begin to stack on the floor of the printer cabinet.
3. Verify the following and make any necessary adjustments.
   a. The paper perforation folds are folding naturally.
   b. The paper is following a straight path down to the paper stack.
4. Run the printer and stack approximately 15 to 20 sheets of paper.
5. Repeat step 3. Any adjustments to the paper stack can be made while the printer is running. If an adjustment is made, check the stack again after approximately 15 to 20 sheets have been processed.

NOTE: If the paper is not stacking properly, check the following items in addition to those listed in step 3:

1. *If printing occurs across the paper perforations, the paper may not stack correctly. Adjust the Skip–Over Perforation configuration parameter to eliminate printing across the paper perforations.*

2. *If the paper path is too close to either side panel, paper stacking may be disrupted. Adjust the paper path toward the center of the printer, away from the side panels.*

Setting Forms Length

NOTE: Forms length can also be set by control code from the host computer which overrides the control panel setting. Using control codes, the host computer can specify forms lengths other than those available from the control panel. Refer to the Programming chapter for more information.

The printer uses continuous, tractor–fed paper with the forms length set between 1.0 and 24.0 *inches*, or between 1 and 192 *lines* at 6 or 8 lines per inch. Setting the forms length in lines at 6 or 8 lpi does not change the line spacing.

The printer has been preset for 11–inch length paper. When using paper of a different length, the top–of–form setting and the forms length setting must be changed to match the designated length. To set the forms length:

1. Place the printer off line.

2. Simultaneously press MENU UP and MENU DOWN to unlock the printer configuration. ENTER SWITCH NOT LOCKED displays for a moment.

3. Press F/L; the display shows FORMS LENGTH SET IN INCHES.

4. Press NEXT VALUE or PREV VALUE to cycle through the following options: FORMS LENGTH SET IN 6 LPI LINES, FORMS LENGTH SET IN 8 LPI LINES, and FORMS LENGTH SET IN INCHES. Select an option and perform the corresponding instructions below.

To Set Forms Length in Inches

1. Press NEXT VALUE or PREV VALUE until FORMS LENGTH SET IN INCHES is displayed.

2. Press MENU DOWN or F/L to display the current forms length in inches.

3. Press NEXT VALUE or F/L to increase the forms length by 0.5 inches, or press PREV VALUE to decrease the forms length by 0.5 inches. When the appropriate value is displayed, save it as described below.

4. Press ENTER to select the displayed forms length.

5. Press CLEAR to return to OFFLINE READY.

6. Simultaneously press MENU UP and MENU DOWN to lock the printer configuration.
7. Set the top–of–form according to the instructions on page 2–12.

To Set Forms Length in Lines

1. Press NEXT VALUE or PREV VALUE until FORMS LENGTH SET IN 6 LPI LINES or FORMS LENGTH SET IN 8 LPI LINES displays.
2. Press MENU DOWN to display the current forms length in lines.
3. Press NEXT VALUE to increase the forms length by one line, or press PREV VALUE to decrease the forms length by one line. When the appropriate value displays, save it as described below.
4. Press ENTER to select the displayed forms length.
5. Press CLEAR to return to OFFLINE READY.
6. Simultaneously press MENU UP and MENU DOWN to lock the printer configuration.
7. Set the top of form according to the instructions on page 2–12.

Selecting Print Mode

During normal operation, the message display indicates the printer is on line and what print mode is currently selected; for example:

```
ON LINE
DP AT 10 CPI
```

1. Place the printer off line and raise the printer cover.
2. Simultaneously press MENU UP and MENU DOWN. ENTER SWITCH NOT LOCKED displays momentarily.
3. Press MODE. The currently selected print mode displays.
4. Press NEXT VALUE or PREV VALUE to cycle through the various print mode options. The following print mode options are available:

   - Data Processing (DP) at 10, 12, 13.3, 15, and 17.1 cpi
   - Correspondence (NLQ) at 10, 12 and 15 cpi
   - High Speed (HS) at 10, 12, 13.3, 15 and 17.1 cpi
   - OCR–A at 10 cpi
   - OCR–B at 10 cpi
   - Barcode 145 (12 cpi)
   - Barcode 160 (13.3 cpi)

   NOTE: The control panel actually displays 13 or 17 cpi when 13.3 or 17.1 cpi, respectively, is selected.

5. When the desired print mode is shown on the display, press the ENTER switch.

6. Press CLEAR to return the printer to off line status. The display reads OFFLINE READY.

7. Simultaneously press MENU UP and MENU DOWN to lock the printer configuration.

8. Close the printer cover and place the printer on line.

For additional printing capabilities and character attributes, refer to the Programming chapter. Print mode control from the host overrides the control panel setting.

Setting Line Spacing

P3040 Multinational printers can be set for a line spacing of 6, 8, or 10.3 lines per inch (lpi) from the control panel by using the 6/8 LPI switch. To select the line spacing from the control panel, perform the following steps.

1. Place the printer off line and raise the printer cover.

2. Press 6/8 LPI. The currently selected lpi setting displays.

3. Press NEXT, PREV, or 6/8 LPI to step through the 6, 8, and 10.3 lines–per–inch selections. The light beside the 6/8 LPI switch lights when the selected line spacing is other than 6 lpi.

4. Press CLEAR when the desired line spacing setting is displayed. The printer is placed off line and the display reads OFFLINE READY.

5. Close the printer cover and place the printer on line.

Line spacing can also be selected by sending line spacing control codes from the host computer as described in the Programming chapter. Using control codes, the host computer can specify line spacing other than 6, 8, or 10.3 lpi. Line spacing control from the host computer overrides the control panel setting.

Printer Reset

This function resets the printer to the configuration values *last saved* (not factory default values), and the current form position becomes the top–of–form. The printer can be reset to the power–up configuration values at any time: on line, off line, or while printing. However, it is recommended that you reset the printer only when it is off line to prevent the possible loss of data. The printer can also be reset through the host. (Refer to the Programming chapter.)

To reset the printer, press CLEAR and RUN/STOP (R/S) simultaneously.

❑ IMPORTANT ❑

Information regarding Hex Code Printout, Running the Self–Test, and Fault Condition Messages is located in the Routine Service and Diagnostics chapter.

CHAPTER 3

CONFIGURATION

Introduction

Configuration refers to the set of operating parameters that define how the printer responds to the electronic interface signals and the commands sent from the host computer. Most configuration parameters are selected from the control panel, as shown in the Control Panel Configuration Diagram at the end of this chapter.

Read this chapter before configuring any printer function. The following information is presented:

For more information on operating and configuring the Multinational Character Sets, refer to the Multinational Character Sets chapter.

Lock/Unlock Printer Configuration

The ENTER switch must be unlocked to reconfigure the printer from the control panel. At powerup, the printer configuration is locked to prevent accidental reconfiguration. In order to change any configuration value, the ENTER switch must be unlocked. Pressing MENU UP and MENU DOWN *simultaneously* (while the printer is off line) will alternately unlock and lock the ENTER switch. The message display will briefly read ENTER SWITCH NOT LOCKED or ENTER SWITCH LOCKED when the printer configuration is unlocked or locked, respectively. While in the configuration menus, pressing the ENTER switch will enter a selected value into printer configuration.

Configuration Menus

With the printer off line, pressing MENU DOWN, then repeatedly pressing NEXT or PREV VALUE displays the main configuration menus. The individual parameter values or secondary menus are displayed by again pressing MENU DOWN. All parameter options within a menu may be viewed by pressing NEXT or PREV VALUE. Pressing MENU UP moves the configuration menu up one level.

From the main configuration menus below, related configuration parameter values can be displayed and selected.

- Character Set
- Application Compatibility
- Paper Format
- Host Interface
- Load Parameters
- Save Parameters
- Diagnostics

Once the ENTER switch is unlocked, displayed values can be selected as the current configuration by displaying the value in the message display and pressing ENTER. You can exit from a configuration menu by pressing CLEAR, which places the printer off line.

NOTE: If an "E" is displayed in the upper right corner of the LCD, the VFU is enabled. If a "L" is displayed in the lower right corner of the LCD, the VFU is loaded.

Configuration Printout

The configuration printout lists all of the currently selected configuration parameter values. A sample configuration printout is shown in Figure 3–1. Configuration parameters on the printout are listed in the same order as the configuration menu via control panel.

The following general procedure is used to obtain a configuration printout. Refer to the Control Panel Configuration Diagram beginning on page 3–7 for an illustration of the available menus and values. When you return to OFFLINE READY, the previous print mode and LPI is restored, and all print attributes are canceled. All other format parameters are unaffected.

1. Place the printer off line.
2. Select and display the CONFIGURATION PRINTOUT menu in the DIAGNOSTICS menu by pressing MENU DOWN and then PREV VALUE until DIAGNOSTICS appears in the message area.
3. Press MENU DOWN to display CONFIGURATION PRINTOUT in the message area.
4. Press R/S. The configuration printout prints.
5. Press CLEAR to return to OFFLINE READY.
6. Place the printer on line.

```
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P3040  DCU  : 117246-001 VER 02.02F D.C.  9033

P3040  MCU  : 117688-001 VER 01.05B D.C.  8936

P3040  CHAR : 117244-001 VER 02.02C D.C.  9031

     FORMS LENGTH SET     AT  11.0 INCHES
     LINE SPACING         SET AT 6.00 LPI
     PRINT MODE           DP AT 10 CPI
     SELECT SET           IBM PC
     SELECT LANGUAGE      ASCII
     SELECT SUBSET        IBM PC GRAPHICS

     APPLICATION          COMPATIBILITY
         PRINTER PROTOCOL     P-SERIES
         PRINTER SELECT       DISABLE
         PAPER ADVANCE SW     PRINT + PAP ADV
         POWER ON STATE       ONLINE
         ALARM ON FAULT       ENABLE
         UNIDIRECTIONAL       DISABLE
         SELECT SFCC           01 SOH
         80-9F HEX            CONTROL CODES
         CONTROL CODE 08      DOUBLE HIGH
         OVERSTRIKE           ENABLE
         CONTROL CODE 06      8 LPI

     PAPER FORMAT
         AUTO LINE FEED       AFTER FULL LINE
         DEFINE CR CODE       CR = CR
         DEFINE LF CODE       LF = CR + LF
         VFU SELECT           EVFU
         PERFORATION SKIP      00.0 INCH
         PAPER OUT            END OF PAPER
         PMD FAULT            ENABLE
         PRINT WIDTH          13.2 INCHES

     HOST INTERFACE       CENTRONICS
         DATA BIT 8           ENABLE
         DATA POLARITY        STANDARD
         RESP POLARITY        STANDARD
         PI LINE              DISABLE
         STROBE POLARITY      STANDARD
         LATCH DATA ON        LEADING EDGE
```

Figure 3–1. Sample Configuration Printout

Factory Default Configuration Values

The printer comes with a set of *Printronix* factory configuration values, shown in Table 3–1. These values are set at the factory, and are operational when the printer is received. New values can be saved and applied as necessary for each application, but factory default values remain accessible using the LOAD PARAMETERS configuration. On the Control Panel Configuration Diagram, factory configuration values are indicated by a asterisk (*). (The asterisk is not shown on the printer display.) Refer to the Configuration Procedure on page 3–5 to change values of the configuration parameters for your application.

Table 3–1. Printronix Factory Default Configuration Values

Configuration Parameter	Factory Default Value	Configuration Parameter	Factory Default Value
Forms Length	11.0 Inches	Parallel Interfaces:	
Line Spacing	6 lpi	Data Bit 8	Enable
Print Mode	DP 10 cpi	Data Polarity	Standard
Select Set	IBM PC	Resp. Polarity	Standard
Select Language	ASCII	PI Line	Disable
Select Subset	IBM PC Graphics	Strobe Polarity	Standard
		Latch Data On	Leading Edge
Printer Protocol	P–Series	Serial RS–232 Interface:	
Printer Select	Disable	Data Protocol	X–On / X–Off
Paper Advance Switch	PRINT + PAP ADV	Data Rate	9600 Baud
Power On State	Online	Word Length	8 Bits
Alarm On Fault	Enable	Stop Bit	One
Unidirectional	Disable	Parity	None
Select SFCC	01 SOH	Bit 8 Function	Font Select
80–9F Hex	Control Codes	CD AND CTS	Disable
Control Code 08	Double High	DSR	Disable
Control Code 06	8 lpi	Data Term Ready	Online and BNF
Overstrike	Enable	Request to Send	Online and BNF
		Reverse Channel	Online and BNF
Auto Line Feed	After Full Line		
Define CR Code	CR = CR		
Define LF Code	LF = CR + LF		
VFU Select	EVFU		
Perforation Skip	00.0 Inch		
Paper Empty	End of Paper		
PMD Fault	Enable		
Print Width	13.2 Inches		
Host Interface	Centronics		

Configuration Procedure

Most configuration options are selected from the control panel. To change the configuration from the control panel, the printer must be powered up, off line (OFFLINE READY), and the control panel ENTER switch enabled (unlocked). The current configuration may be examined—but not changed—by leaving the ENTER switch locked.

The basic configuration procedure requires pressing MENU DOWN and NEXT or PREV VALUE to arrive at the desired menu. The parameters associated with that menu are accessed by again pressing MENU DOWN, at which time the currently active parameter or a submenu is displayed. NEXT or PREV VALUE are used to sequentially list all the parameters or submenus available within that menu. When the currently active value is shown on the display, it will be indicated with an asterisk (*) next to it. Pressing ENTER selects the parameter visible on the display, and replaces the previous parameter. The Control Panel Configuration Diagram, which illustrates all configuration menus and values, is provided at the end of this chapter. Thoroughly review these diagrams to understand the configuration menu hierarchy and the control panel buttons to select individual menus and parameter values.

The following general procedure can be used to reconfigure the printer from the control panel:

1. Obtain a current configuration printout as described in the Configuration Printout section on page 3–2.

2. Determine the parameter values that must be changed to meet your requirements. Refer to the Control Panel Configuration Diagram for an illustration of the parameter values and the procedure required to select and display the values.

3. Place the printer off line. Enable the ENTER switch by pressing MENU UP and MENU DOWN simultaneously until the messages reads ENTER SWITCH NOT LOCKED.

4. Select and display the desired menu by pressing MENU DOWN and then NEXT VALUE or PREV VALUE until the name of the menu appears in the message display.

5. Select and display the required value(s) for the selected menu item by pressing MENU DOWN and then NEXT or PREV VALUE until the value appears in the message display.

6. Save the selected value(s) by pressing ENTER.

7. After all parameters have been changed as required, select the SAVE PARAMETERS main menu and press ENTER. This will save the current parameter values as the default values.

8. Press CLEAR to place printer off line. Disable the ENTER switch by pressing MENU UP and MENU DOWN simultaneously. ENTER SWITCH LOCKED temporarily appears in the message display.

9. Place the printer on line by pressing ON LINE. The selected values are effective.

Load Configuration Values

The previously saved default value set or the permanently stored *Printronix* factory value set can be loaded for use as needed. This procedure provides a convenient method of resetting the printer configuration to a known value set.

1. Place the printer off line by pressing ON LINE. Enable the ENTER switch by pressing MENU UP and MENU DOWN simultaneously. ENTER SWITCH NOT LOCKED temporarily appears in the message area.

2. Select and display the LOAD PARAMETERS main menu by pressing MENU DOWN and then NEXT or PREV VALUE.

3. Press MENU DOWN and then NEXT or PREV VALUE to select either the LOAD SAVED PARAMETERS or LOAD FACTORY PARAMETERS menu. If an IGP, IBM 3287, or IBM 5225 emulation board is installed, select the appropriate standard configuration listed in this menu.

4. Press ENTER once the desired selection is shown in the message display. The display then reads LOAD SAVED COMPLETED or LOAD FACTORY COMPLETED.

5. After all parameters have been changed as required, select the SAVE PARAMETERS main menu and press ENTER. This saves the current parameter values as the default values.

6. Press CLEAR to return to OFFLINE READY.

7. Disable the ENTER switch by pressing MENU UP and MENU DOWN simultaneously. Place the printer on line by pressing ON LINE.

Control Panel Configuration Diagram

The Control Panel Configuration Diagram is a series of block diagrams that show the configuration menus and the parameters (values) available within each menu. Boxes on the diagram represent the message area, the message that appears on the display is printed inside the box, and the letters outside the boxes adjacent to the directional arrows represent control panel switches. When a switch is pressed, an arrow leads to the displayed result of pressing that switch. The symbols used on the Control Panel Configuration Diagram are summarized in Figure 3–2.

The diagram is presented in 3 levels, each level illustrating a particular set of parameter menus and values. The relationships between the three levels are summarized in Figure 3–3.

Level I – Print Format

- Line Spacing
- Print Mode
- Forms Length Set

Level II – Main Configuration Menus

- Character Set
- Application Compatibility
- Paper Format
- Host Interface
- Load Parameters
- Save Parameters
- Diagnostics

Level III – Configuration Menu Parameters

Select Set IBM PC
Select Set Multinational
Select Set ECMA–94 Latin 1
Select Set DEC Multinational

Printer Protocol
Printer Select
Paper Advance Switch
Power On State
Alarm On Fault
Unidirectional
Select SFCC
80–9F Hex
Control Code 06
Control Code 08
Overstrike

Level III – Configuration Menu Parameters (continued)

Auto Line Feed
Define CR Code
Define LF Code
VFU Select
VFU Table (Save/Clear)

Perforation Skip
Paper Out
PMD Fault
Print Width

Centronics Interface Parameters
Dataproducts Interface Parameters
Serial RS–232 Interface Parameters
Data Bit 8
PI Line
Data Polarity CD and CTS
Response Polarity
Strobe Polarity
Latch Data On
Data Protocol

Data Rate
Word Length
Stop Bit
Parity
Bit 8 Function

DSR
Data Term Ready
Request To Send
Reverse Channel

Load Saved Parameters
Load IGP Parameters
Load IBM 3287 Parameters

Load IBM 5225 Parameters
Load Factory Parameters

Configuration Printout
Print Data Stream In Hex Code
Printer Test 8 Inch Width
Printer Test Full Width
Shift Recycle Ribbon
All E’s

E Plus TOF
All H’s
Underline Only
Black Plot
Shuttle/

Stroke Time
Shuttle Rebound Index
Hammer Phasing Index

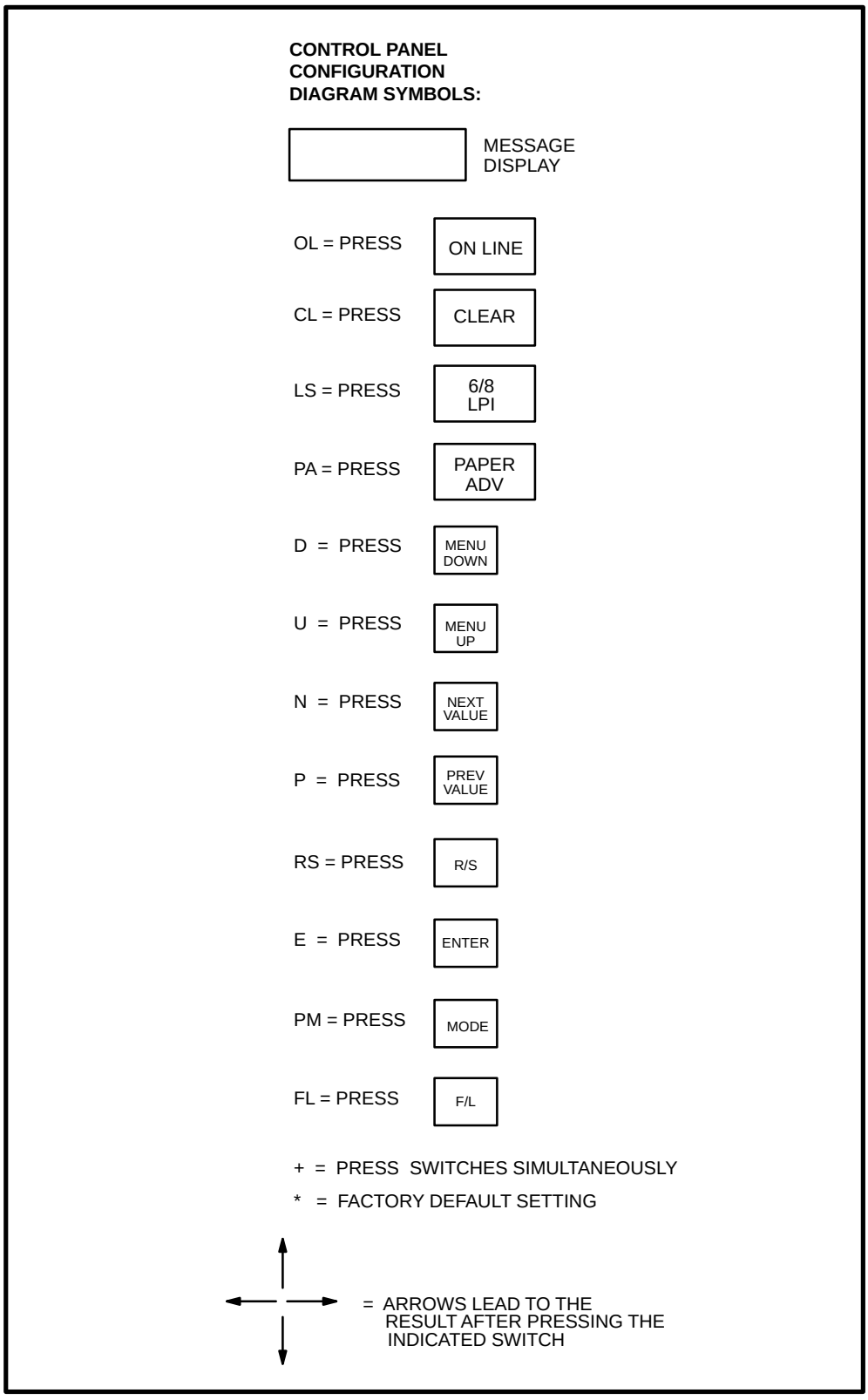


Figure 3–2. P3000 Control Panel Configuration Diagram Symbols

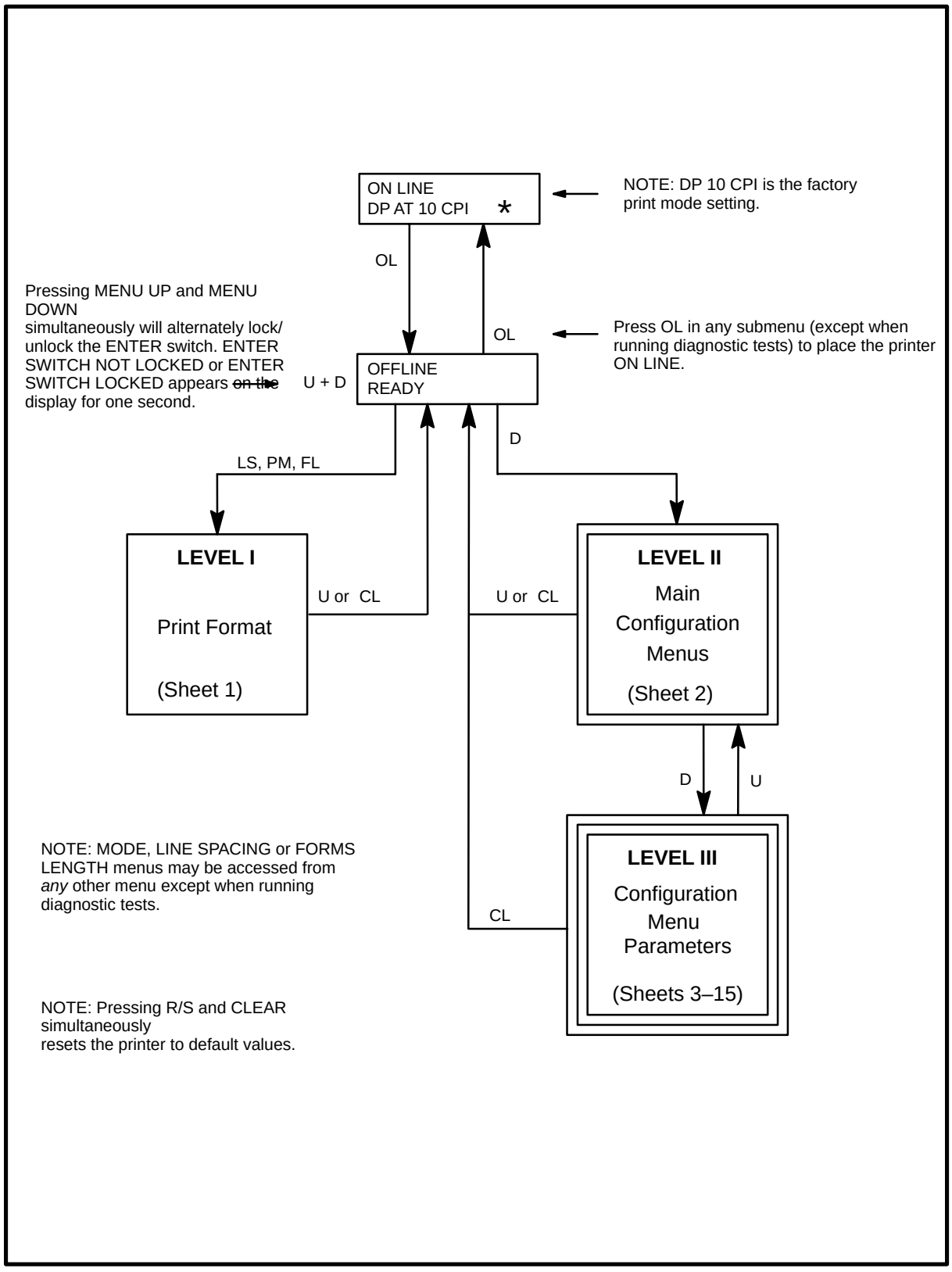
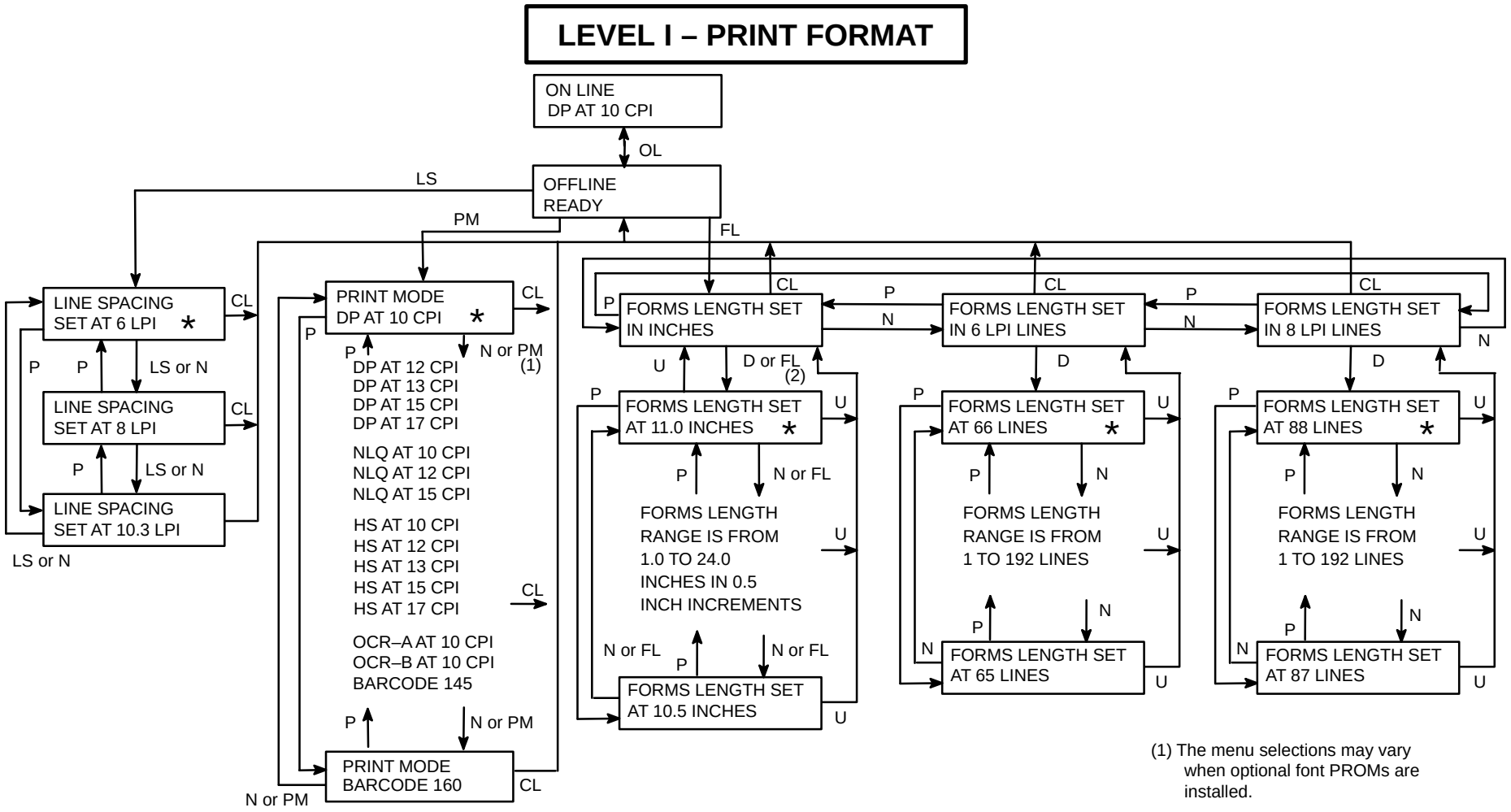


Figure 3–3. Control Panel Overview

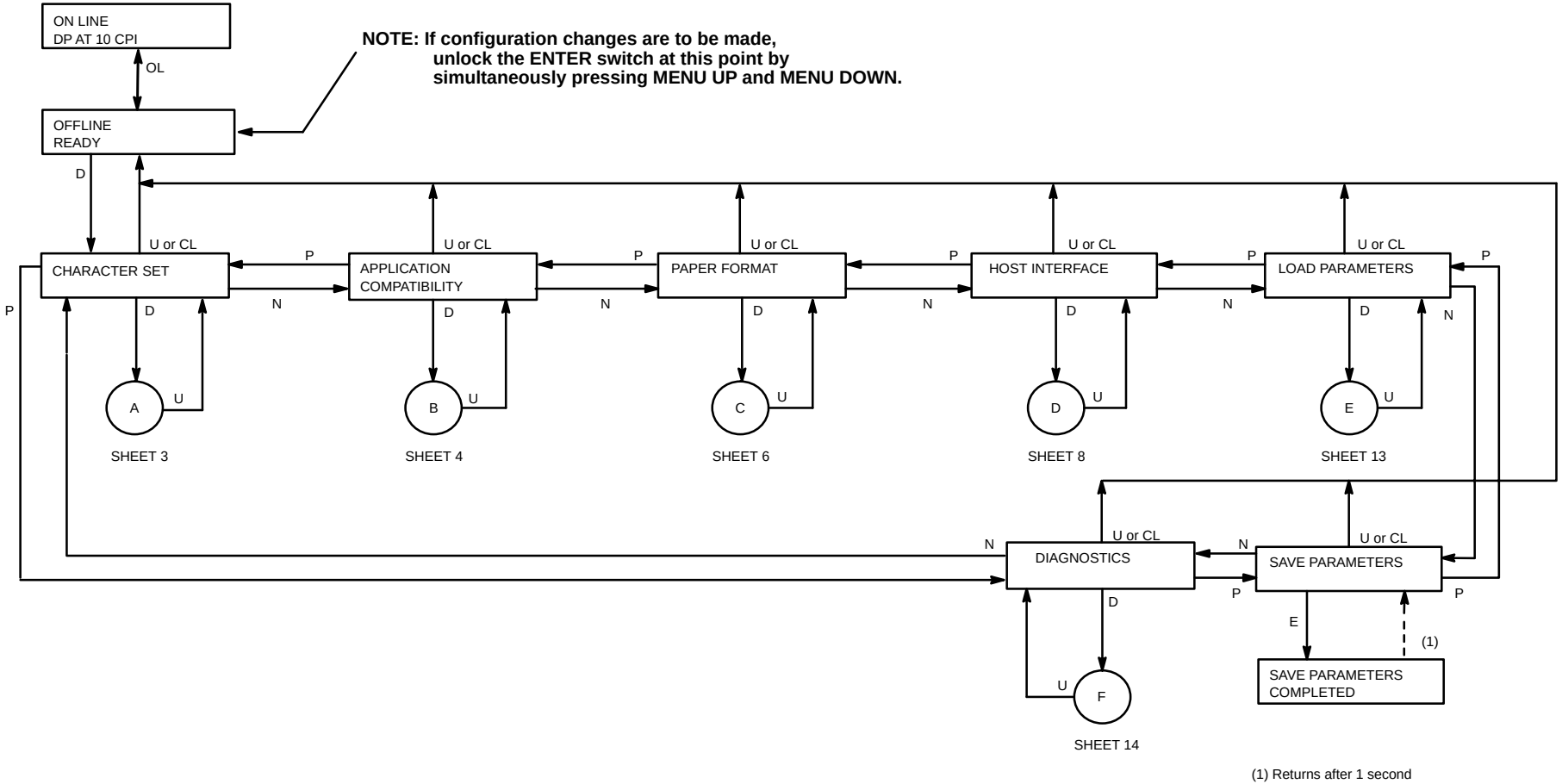


(1) The menu selections may vary when optional font PROMs are installed.

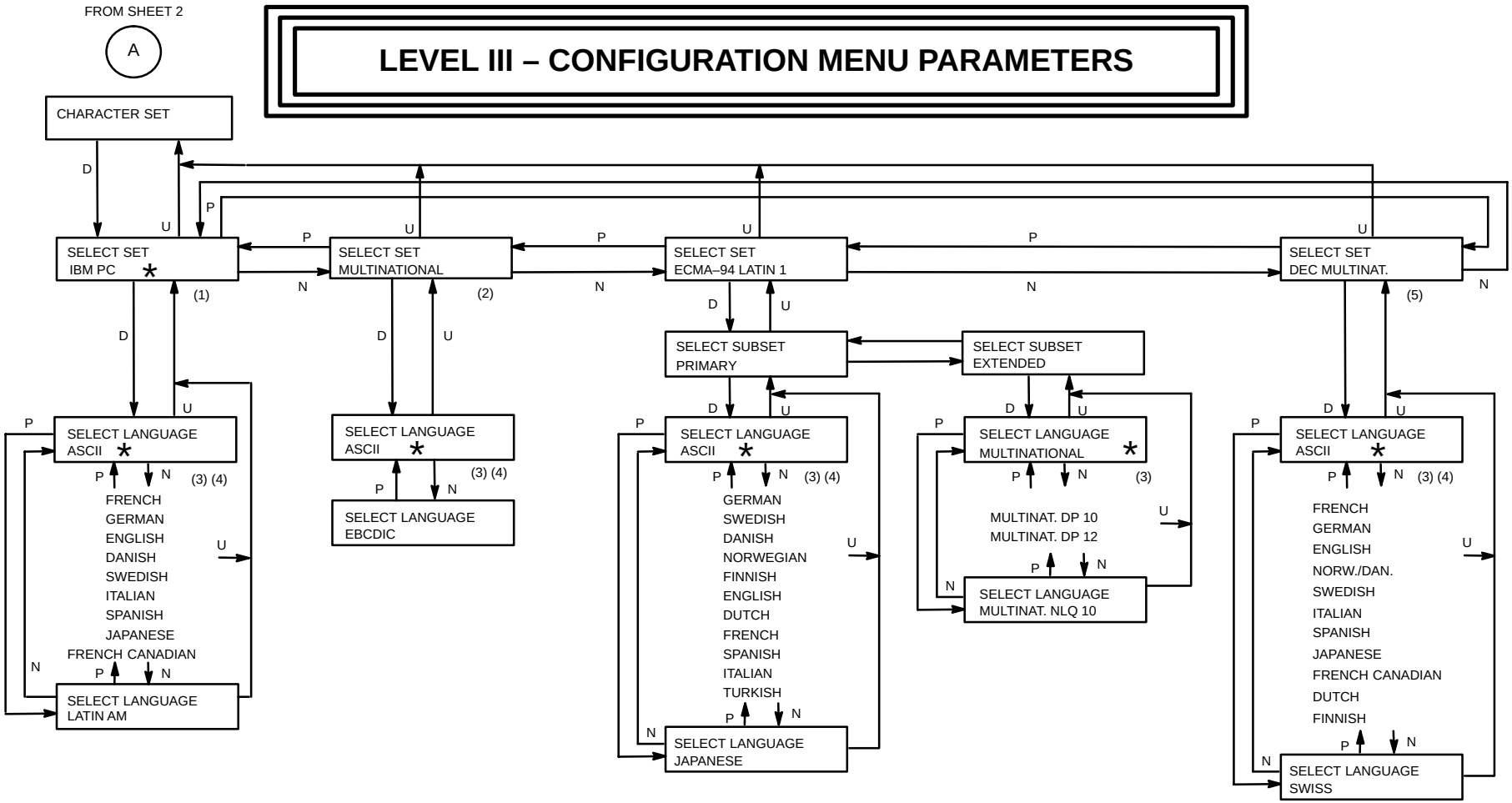
(2) If a VFU is enabled and loaded, FORMS LENGTH SET BY VFU Will be displayed.

Control Panel Configuration Diagram (sheet 1 of 15)

LEVEL II – MAIN CONFIGURATION MENUS



Control Panel Configuration Diagram (sheet 2 of 15)



NOTE: OCR–A and OCR–B are selected from the print format at level 1 on the configuration diagram (with DP, NLQ, and HS features).

(1) EXTENDED SUBSET is IBM PC GRAPHICS

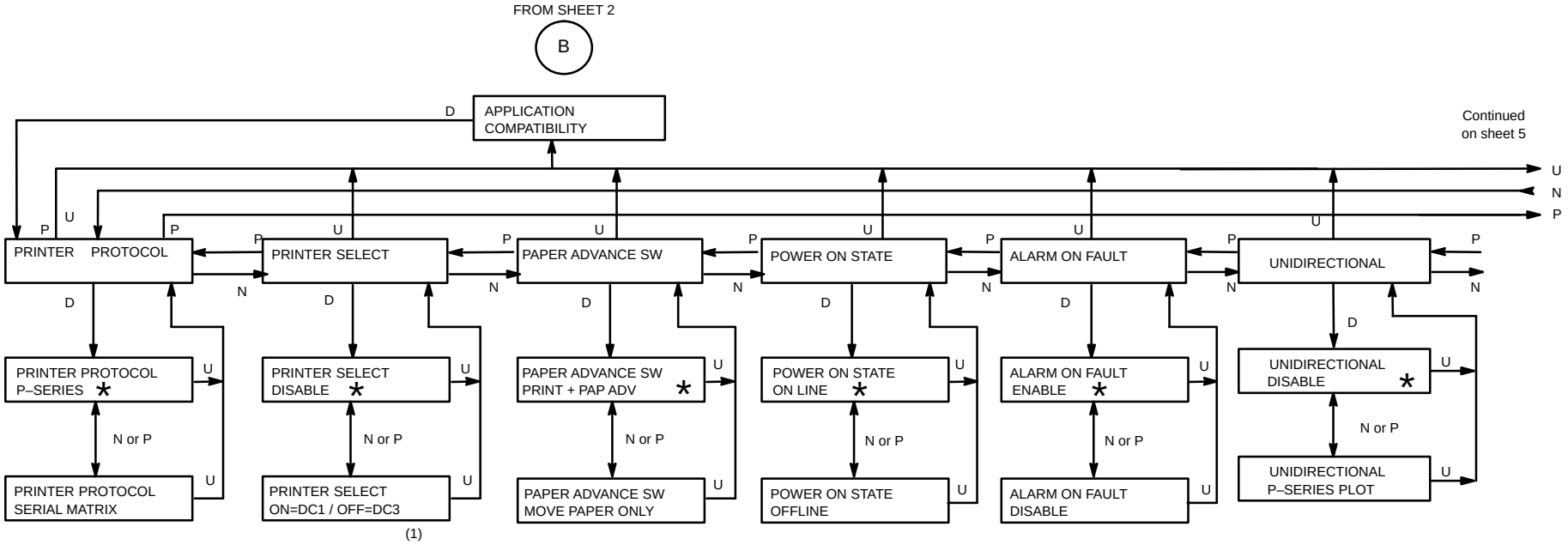
(2) EXTENDED SUBSET is MULTINATIONAL

(3) The menu selections may vary when optional font PROMS are installed

(4) DOWNLOADED is displayed when a downloaded substitution table is active

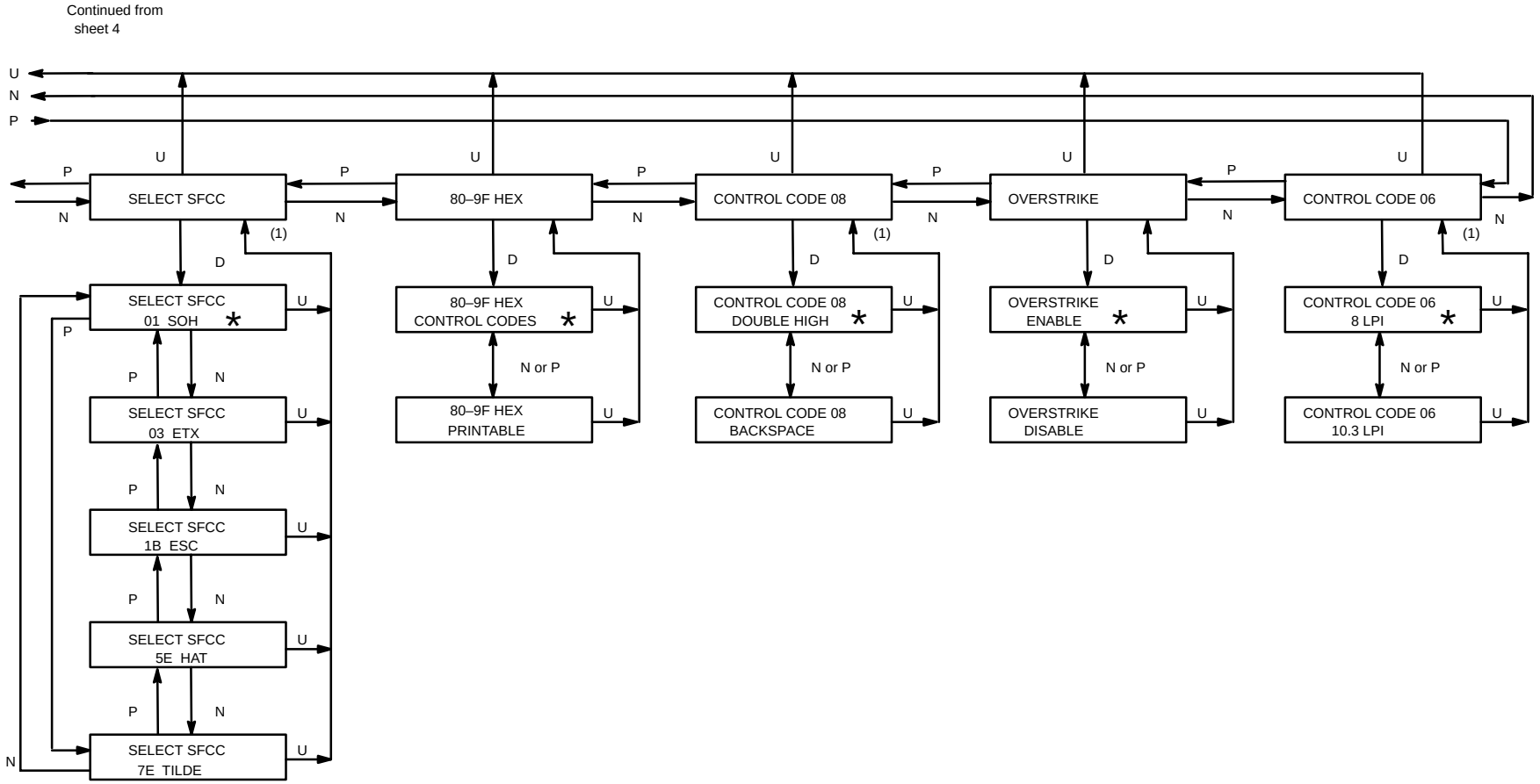
(5) EXTENDED SUBSET is DEC MULTINATIONAL

Control Panel Configuration Diagram (sheet 3 of 15)



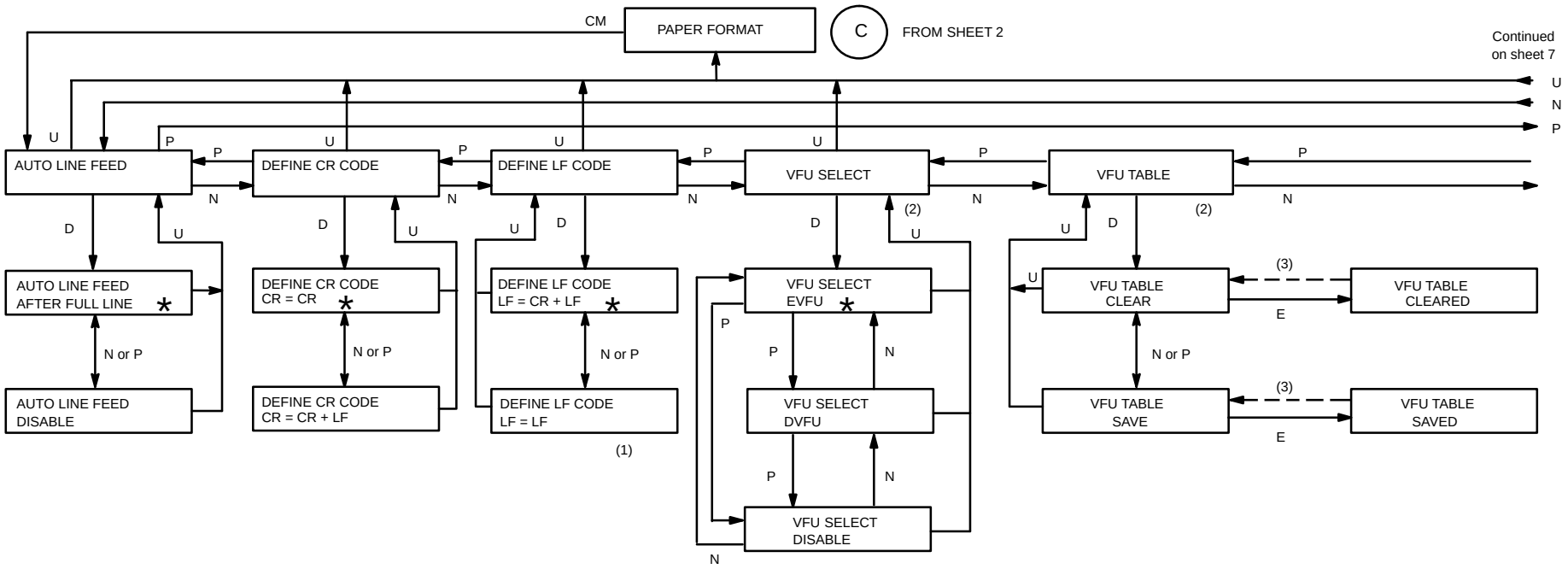
(1) Not applicable in P–Series (menu box not displayed)

Control Panel Configuration Diagram (sheet 4 of 15)



(1) Only available in P–Series protocol
(NOT APPLICABLE displayed in Serial Matrix protocol)

Control Panel Configuration Diagram (sheet 5 of 15)

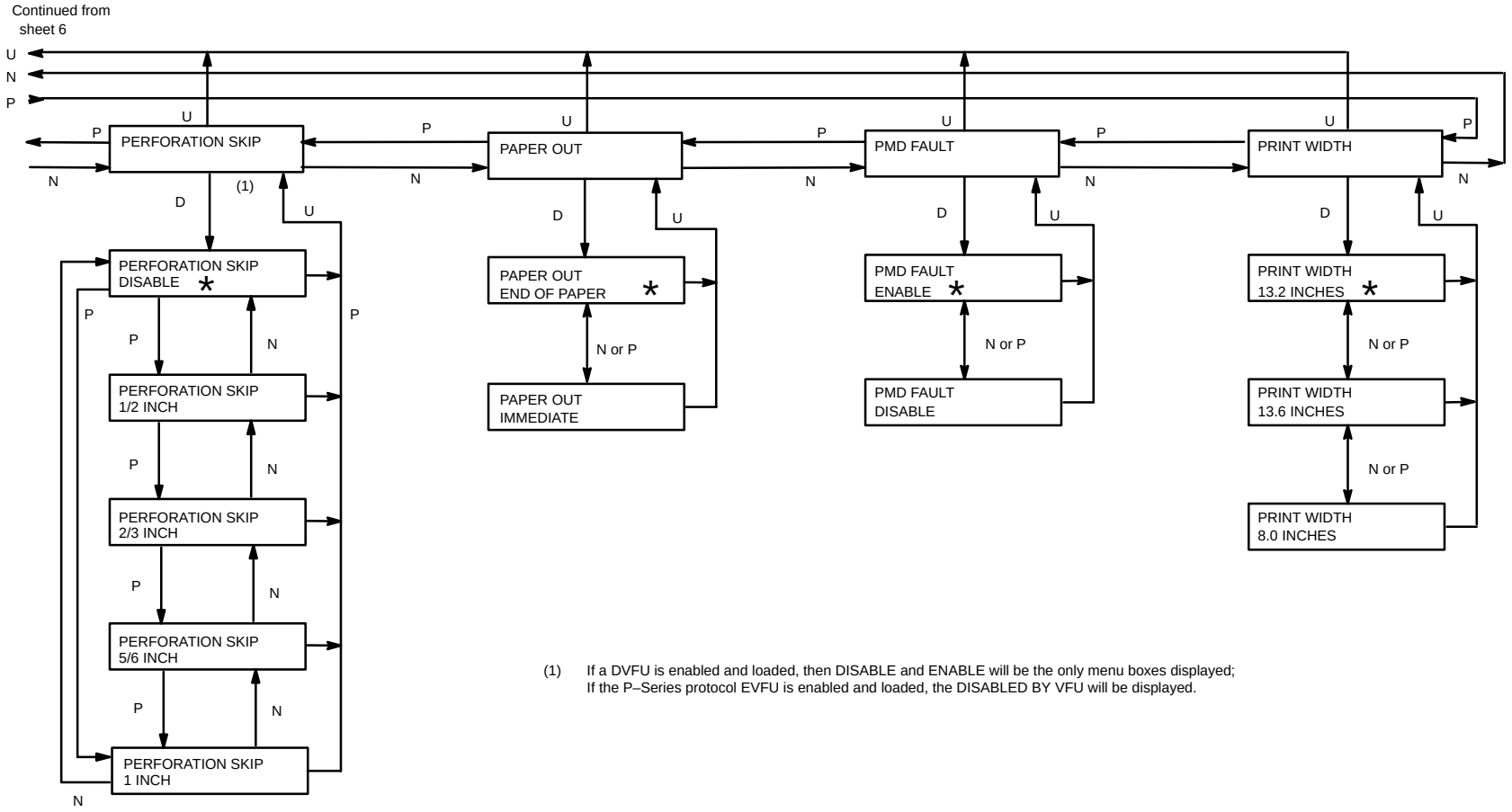


(1) Not available in P–Series protocol
(menu box not displayed)

(2) VFU selections are not available in Serial Matrix protocol

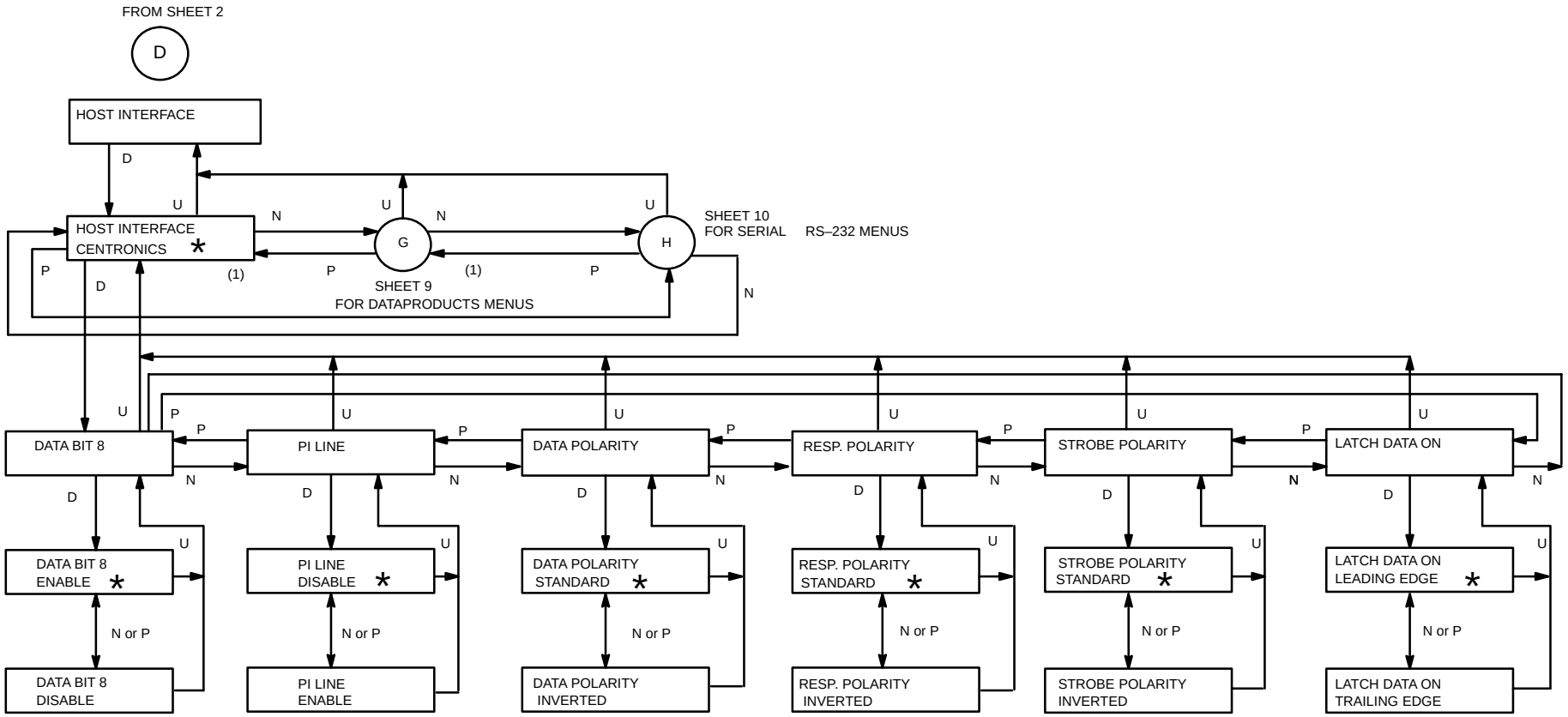
(3) Returns after 1 second

Control Panel Configuration Diagram (sheet 6 of 15)



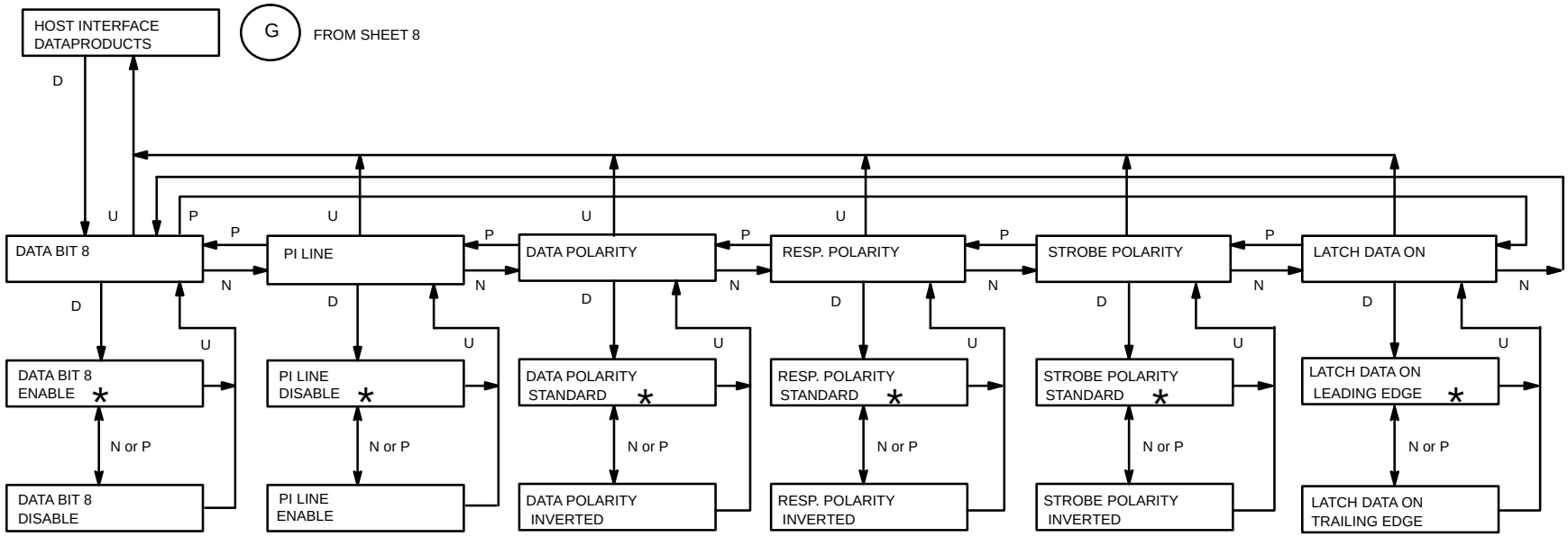
(1) If a DVFU is enabled and loaded, then DISABLE and ENABLE will be the only menu boxes displayed; If the P–Series protocol EVFU is enabled and loaded, the DISABLED BY VFU will be displayed.

Control Panel Configuration Diagram (sheet 7 of 15)

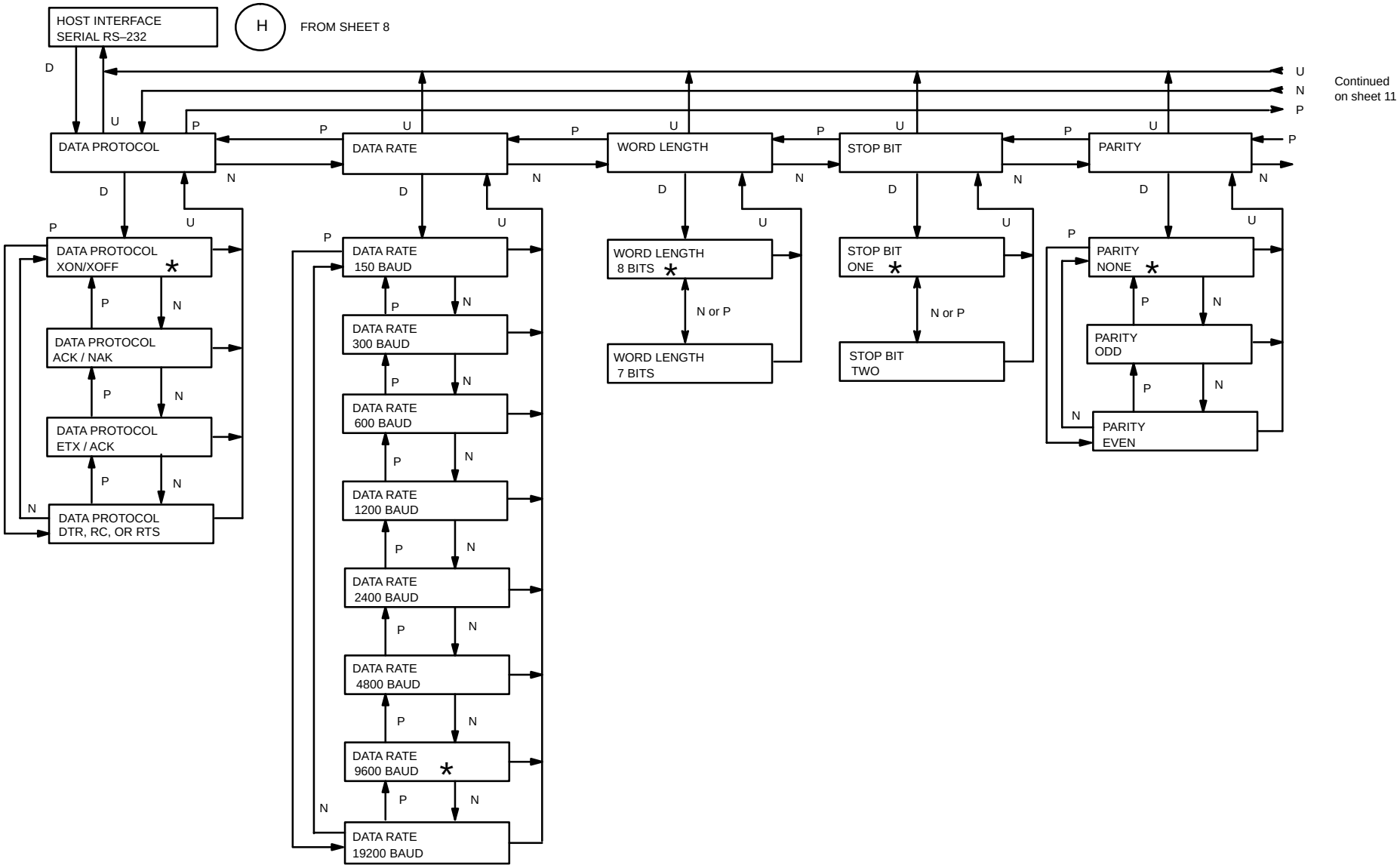


(1) Centronics and Dataproducts parameters cannot be set independently

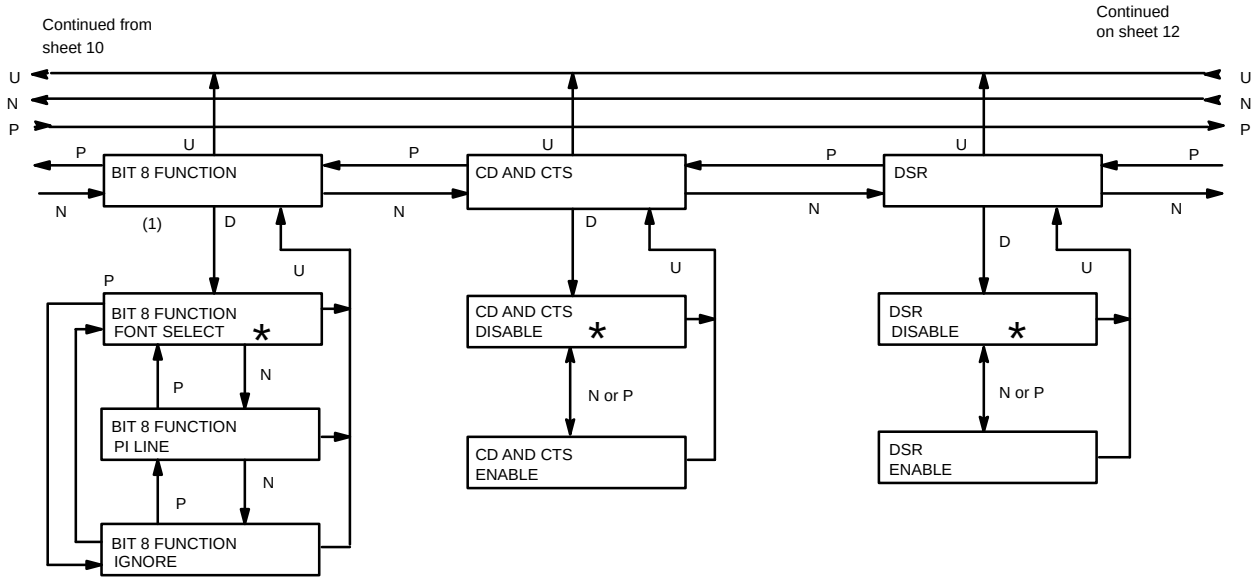
Control Panel Configuration Diagram (sheet 8 of 15)



Control Panel Configuration Diagram (sheet 9 of 15)



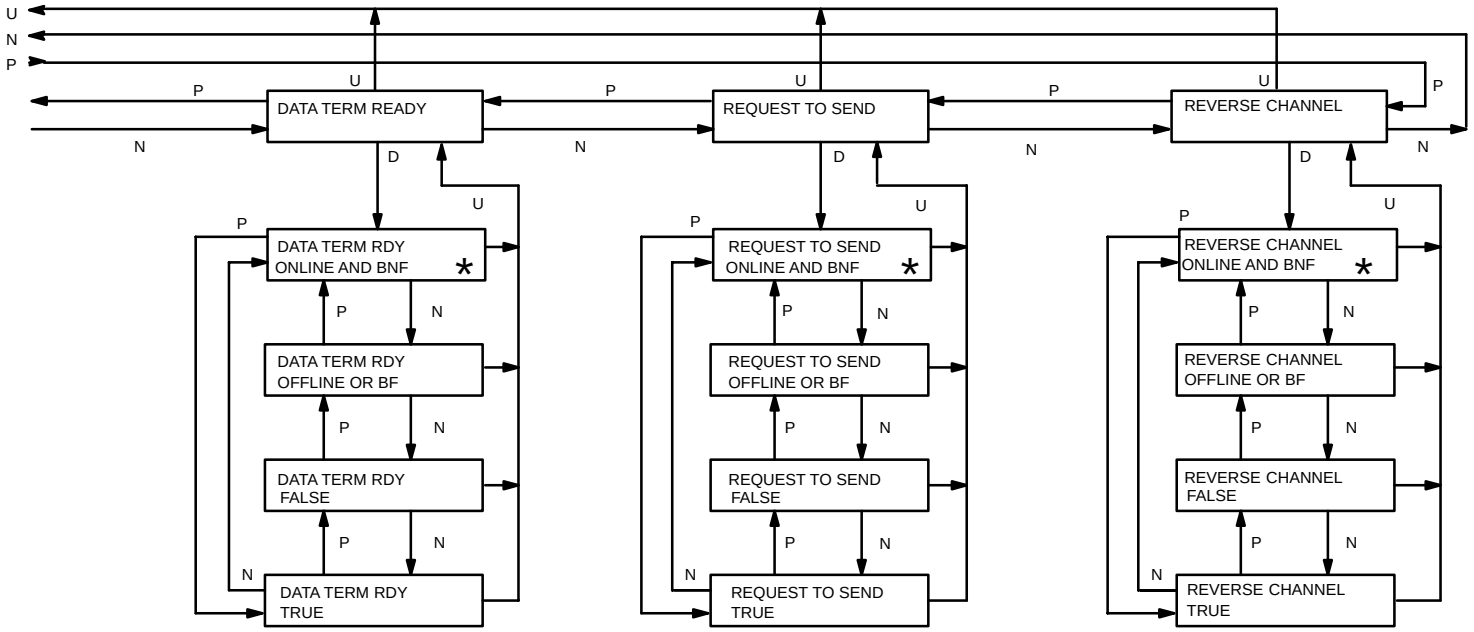
Control Panel Configuration Diagram (sheet 10 of 15)



(1) Not applicable for a 7–bit word (NOT APPLICABLE displayed when appropriate)

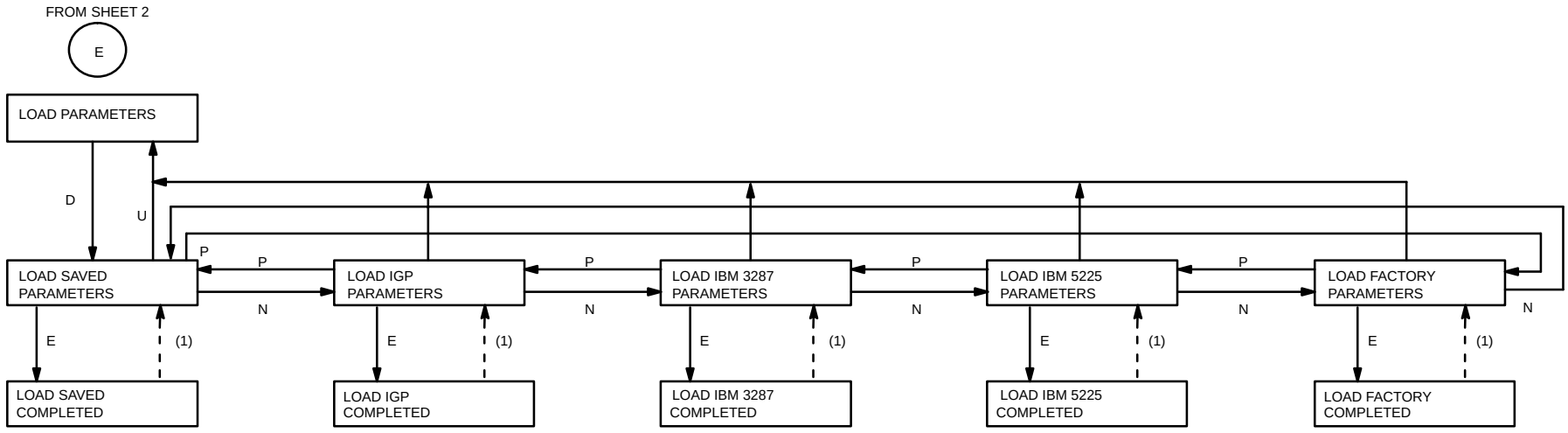
Control Panel Configuration Diagram (sheet 11 of 15)

Continued from
sheet 11



BF = Buffer Full
BNF = Buffer Not Full

Control Panel Configuration Diagram (sheet 12 of 15)



User defined

Same as FACTORY PARAMETERS except:

Host Interface: Dataproducts
80–9F Hex: Printable
Character Set: Multinational
Auto Line Feed: Disable
PI Line: Enable

Same as FACTORY PARAMETERS except:

80–9F Hex: Printable
Character Set: Multinational
Auto Line Feed: Disable

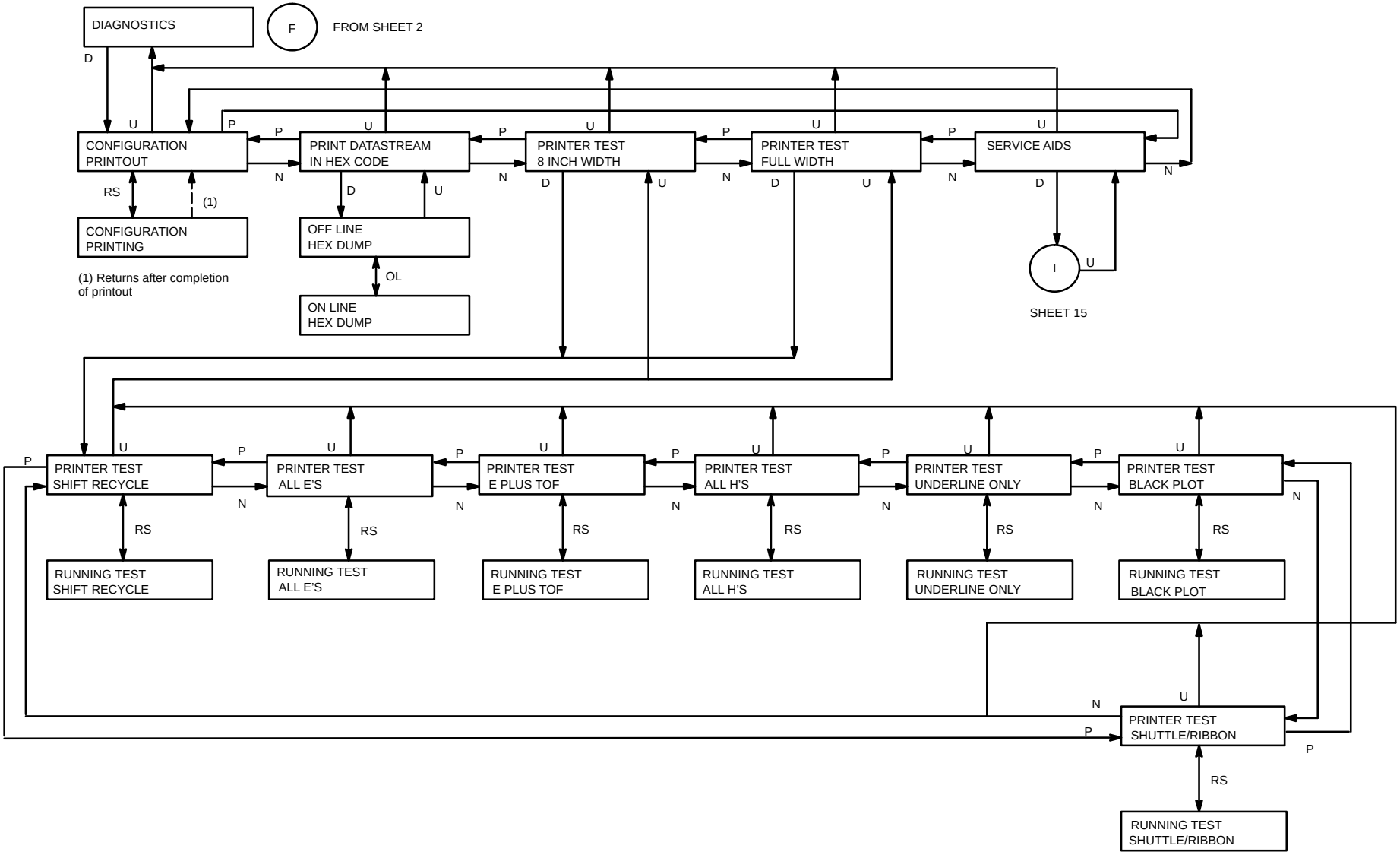
Same as FACTORY PARAMETERS except:

PI Line: Enable
80–9F Hex: Printable
Character Set: Multinational
Auto Line Feed: Disable

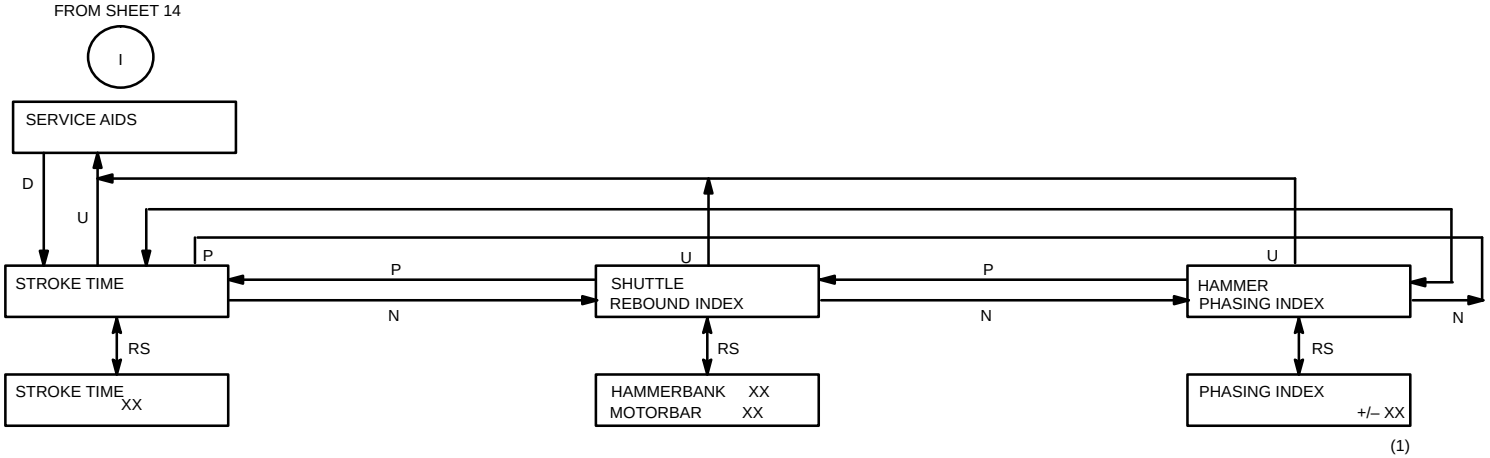
Factory settings are indicated by asterisks in the menu boxes throughout this diagram

(1) Returns after 1 second

Control Panel Configuration Diagram (sheet 13 of 15)



Control Panel Configuration Diagram (sheet 14 of 15)



(1) Increment/decrement the PHASING INDEX by pressing the N/P buttons

Control Panel Configuration Diagram (sheet 15 of 15)

CHAPTER 4

GRAPHICS

Introduction

The printer can produce Bit Image graphics when in Serial Matrix protocol and P–Series Plot Mode graphics when in P–Series protocol. You can print text and graphics on the same line *only* by using the Bit Image protocol in Serial Matrix protocol. In either mode, printing text is the default mode. Consequently, each line of graphics data must include the necessary plot mode commands to enable the printer to perform the desired graphics functions.

The following graphics information is presented in this chapter:

Serial Matrix Compatible Bit Image Graphics

The printer produces Bit Image graphics in Serial Matrix protocol. Bit Image graphics are created by printing a series of vertical Bit Image data bytes which represent the binary code bit pattern. This method utilizes the “1” or “true” bit from a binary data byte to print dot patterns. These data bytes are actually the binary equivalent of ASCII character decimal values 0 through 255. When the data byte is rotated vertically, the result is a vertical data byte pattern with the Most Significant Bit (MSB) at the top.

Plotting a Bit Image Pattern

A Bit Image pattern is produced by following these steps:

1. Lay out the graphic(s) pattern on a quadrille pad or graph paper.
2. Determine the decimal equivalent of each Bit Image data byte required to produce the pattern (Figure 4–1).
3. Write a program to generate the complete pattern.
4. Enter and run the program on the host computer.

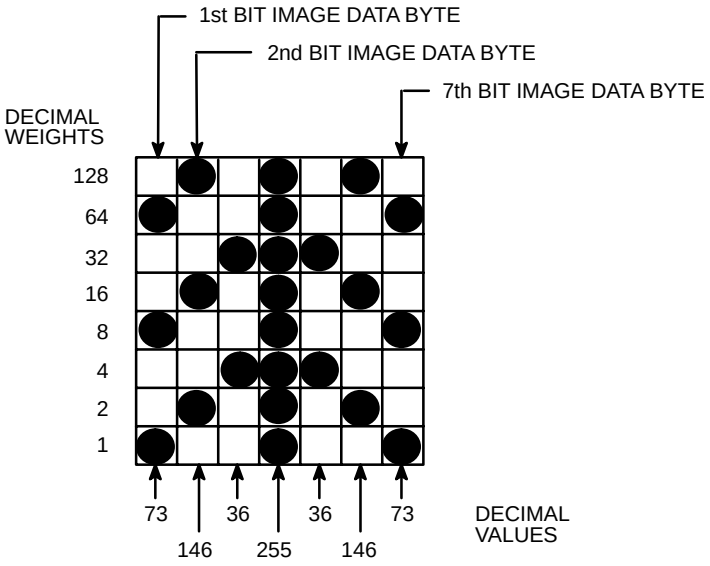


Figure 4–1. Bit Image Pattern Plan

How Bit Image Graphics Are Produced

The binary data byte bit pattern for the ASCII character “A” (hex 41, decimal 65) is pictured in Figure 4–2.

- If this data byte is rotated clockwise, the result is a vertical data byte pattern with the MSB at the top.
- If each “1” or true bit is plotted, the result is a Bit Image plot of the ASCII character “A.”

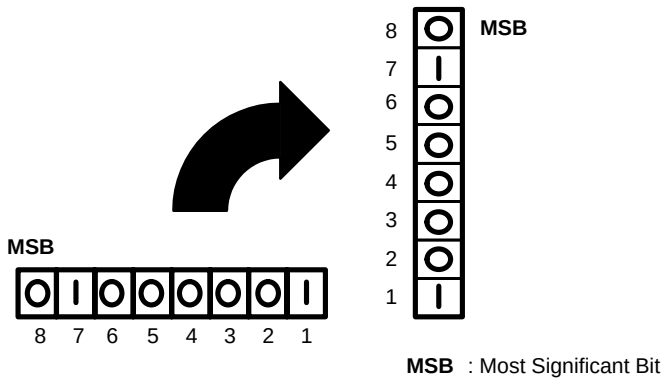


Figure 4–2. Vertical Data Byte Pattern

The relationship of ASCII character, decimal value, and Bit Image plot is shown in Figure 4–3.

- The data bytes can be identified by their binary, octal, hexadecimal, or decimal equivalents. These values are used to generate the Bit Image pattern.
- Bit Image plotting is not limited to printable ASCII characters. You can plot Bit Image patterns for any 8–bit data byte with decimal values ranging from 0 to 255.
- The standard ASCII character chart and its equivalents are listed in Appendix A.

NOTE: Bit Image Graphics is recommended in the Data Processing print mode (120 x 72 dpi). Vertical density variations in other print modes may cause white horizontal bars or overlapping of adjacent graphics lines; however, changing the line spacing can correct this problem.

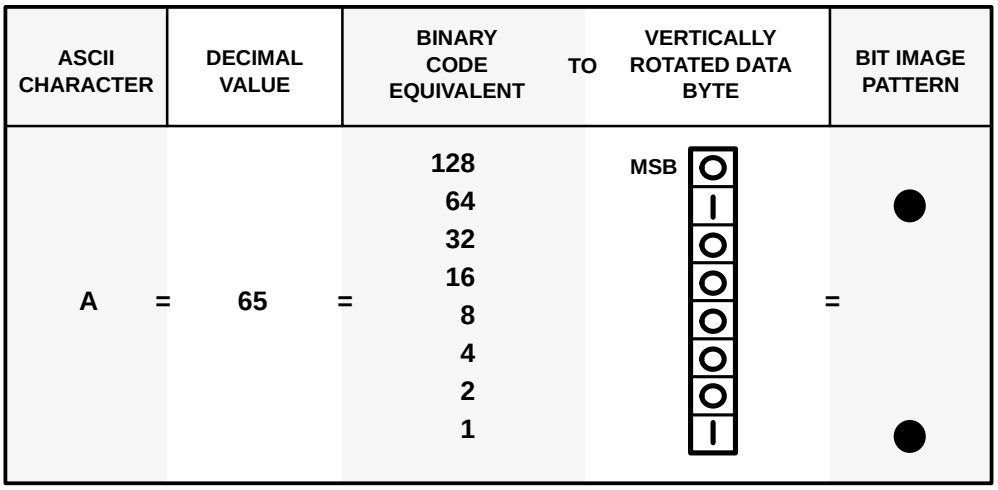


Figure 4–3. Bit Image Pattern from an ASCII Character

Bit Image Density

Bit Image graphics can be printed in different dot densities. Dot densities are selected by control code:

- **Control code ESC K** selects the **Single Density Mode**.

  Single Density Bit Image graphics in the Data Processing print mode are printed at 60 dots per inch (dpi) horizontally and 72 dpi vertically. In the Correspondence print mode, the horizontal dot density is 90 dpi and vertical dot density is 96 dpi. In the High Speed (HS) mode, horizontal dot density is 60 dpi and vertical dot density is 48 dpi.

- **Control code ESC L** selects the **Double Density Mode**.

  The Double Density mode prints up to twice the number of dots per inch horizontally in the same space as used for Single Density. The vertical dot density remains the same as in the Single Density mode. Double horizontal density requires twice the number of input data bytes to print the same length line as for Single Density. Printing double density reduces the printing speed by half.

- If each “1” or true bit is plotted, the result is a Bit Image plot of the ASCII character “A.”

- **Control code ESC Y** selects the **Double Speed, Double Density Mode.**

  When the Double Density, Double Speed control code is received, the data will print at double the current horizontal dot density, but adjacent dots are not printed. Since Double Density graphics are printed at half speed, Double Speed, Double Density graphics are printed at the same speed as are Single Density graphics.

- **Control code ESC Z** selects the **Quadruple Density Mode**.

  When printing Quadruple Density graphics, the printer pairs adjacent quadruple density Bit Image bytes. The compounded data is then printed in the Double Density mode.

Bit Image Programming Format

- The general Bit Image expression is:

  ESC CC(n1)(n2)DATA
  where:

ESC	=	the Serial Matrix compatible header
CC	=	K, L, Y or Z to select dot density (K=single, L=double, Y=double density, double speed Z=quadruple density)
n1, n2	=	n1 + 256 n2 defines the number of data bytes to follow
DATA	=	the dot pattern bytes

- The syntax of the Bit Image expression must be correct.
- The expression must include the appropriate dot density control code, the number of bytes of data to be plotted, and the data itself.
- The number of data bytes and the n1, n2 definition must be equal.
- Any characters following n1 and n2 will be interpreted and plotted as data until the n1, n2 definition is satisfied.
- If n1 = n2 = 0, then control codes K, L, Y, or Z are ignored.

n2 = 2 (700 ÷ 256)	=	700 bytes of data; 2 sets of 256 with a 188 remainder
n1 = 188	=	188–byte remainder

The program statement is: ESC K (188)(2)(DATA)

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

- The maximum number of data bytes in the DATA portion of the program statement (when using 132–column paper) varies according to the operating mode:

  At 60 dpi, Single Density = 792 bytes;

  Double Density = 1584 bytes

  Quadruple Density = 3168 bytes
- Data in excess of the right margin is discarded. If the auto line feed is enabled, data in excess of the right margin causes a Line Feed (LF) and continue printing on the next line.

A detailed description of the individual Bit Image control codes with examples is provided in the Programming chapter.

Bit Image Sample Program

The following sample program written in BASIC produces Single Density Bit Image graphics of the pattern shown in Figure 4–1. The 7 data bit pattern is repeated 40 times. The printed result of running the program is shown in Figure 4–4.

```
5 WIDTH "LPT1:",255
10 LPRINT "Single Density Bit Image Graphics"
20 LPRINT CHR$(27);"K";CHR$(24);CHR$(1);
30 FOR N=1 TO 40
40 RESTORE
50 FOR I=1 TO 7
60 READ R
70 LPRINT CHR$(R);
80 NEXT I
90 NEXT N
100 DATA 73, 146, 36, 255, 36, 146, 73
110 LPRINT
```

Figure 4–4. Sample Single Density Bit Image Graphics

P–Series Compatible Plot Mode

P–Series compatible odd/even dot Plot Mode is available only in P–Series printer protocol. Plot Mode can address and print any individual dot position. This produces a variety of graphics, including bar codes, complex curve graphs, pie and bar charts, block characters, or halftones.

Plot Density

Plot density refers to the number of dots per inch (dpi) printed in a single dot row. Two types of plot density are available with P–Series Plot Mode graphics: normal density and double density.

In **Normal Density Plot**:

- The mode is selected with the odd dot plot control code ENQ (05 hex).
- The odd–numbered dot columns are addressed to produce a horizontal and vertical density that varies, based on the mode of operation:

Print Mode	Horizontal dpi	Vertical dpi
Data Processing (DP)	60	72
Correspondence (NLQ)	90	96
High Speed (HS)	60	48
Barcode 145	72.5	72
Barcode 160	80	72

- Different print modes cannot be mixed on the same dot row.

Figure 4–5 illustrates normal density dot plot.

Figure 4–5. Normal Density Plot

In **Double Density Plot**:

- Two separate shuttle strokes produce double density plot. First the even plot command (EOT, 04 hex) and dot data are sent, followed by the odd plot command (ENQ, 05 hex) and dot data, allowing a maximum of 1584 dots in a single dot row at 60 dpi.
- Even dot plot is sent first for control of the initial plot pattern; then odd dot plot is sent for control of the final dot pattern.
- The dots average .017 inches in diameter.
- The vertical density remains the same in normal and high density plotting.

Figure 4–6 illustrates double density plotting.

Figure 4–6. Double Density Plot

Plot Data Byte Format

In P–Series Plot Mode, the format is as follows:

- Each data byte specifies six out of twelve dot columns.
- Using odd dot plot mode, bits 1 to 6 of the data byte address the odd–numbered dot columns; using even dot plot mode, bits 1 to 6 of the data byte address the even–numbered dot columns.
- Bit 6 and/or bit 7 of the data byte must be a “1” (or true) bit in the Plot mode.
- Bit 8 of the data byte is not used in the Plot mode and may be either a 1 or 0.
- The binary equivalent of the plot data bytes must be known to address specific dot positions accurately.

As shown in Figure 4–7, a dot is printed at the location addressed by each of bits 1 to 6 in the data byte that is set (1 or true).

NOTE: Bit order in Figure 4–7 is reversed.

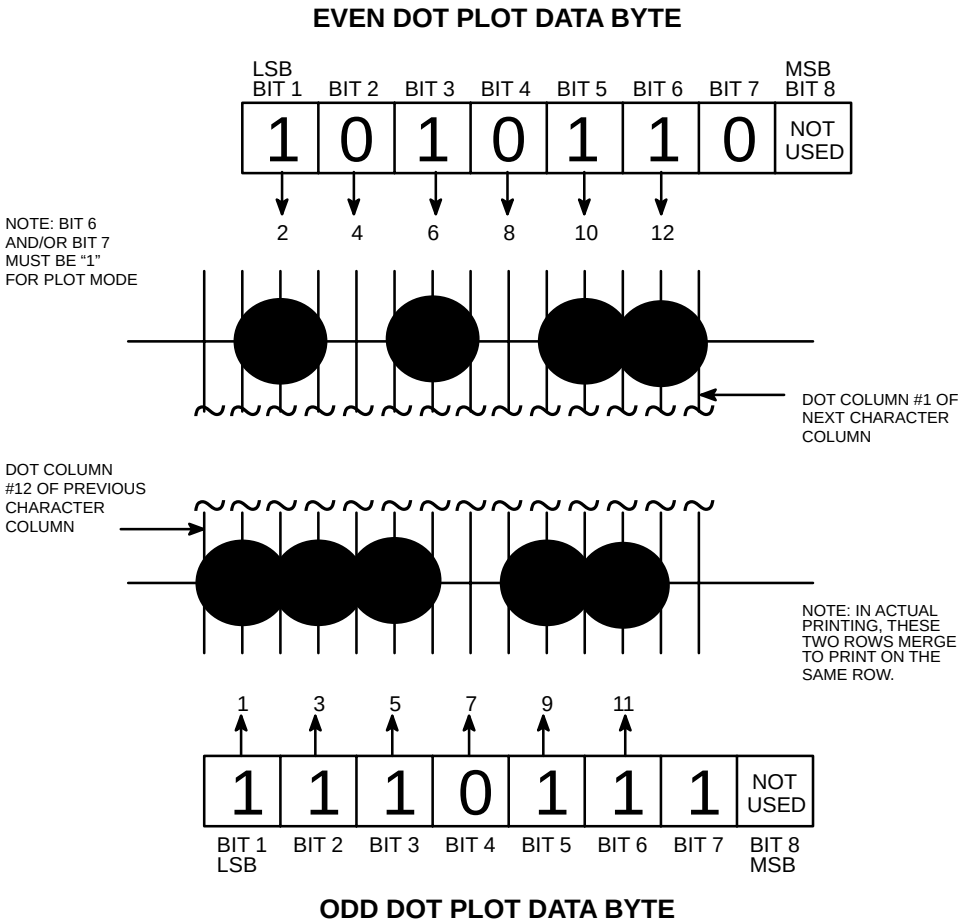


Figure 4–7. P–Series Plot Data Byte Format

Plot Data Line Format

A plot data line may contain any number of plot data bytes up to the maximum of 132 for horizontal dot density of 60 dpi (Data Processing mode) or 198 bytes for a horizontal dot density of 90 dpi (Correspondence mode). If Auto Line Feed is disabled, any bytes over the maximum are lost. If the maximum is exceeded and Auto Line Feed is enabled, a Line Feed (LF) is forced and the remaining plot data is printed as text on the next line.

The plot mode control code may occur anywhere in the line prior to the line terminator, but plot speed may decrease if it is not at the beginning of the line.

NORMAL DENSITY PLOT

For normal density plot, the plot line contains: Control Code 05 hex, plot data bytes, and a Line Terminator (0A hex or 0C hex). The control sequence for sending the P–Series **Normal Density Plot** is as follows:

1. Send the plot command code ENQ (05 hex).

2. Send the plot data bytes. (Refer to Table 4–1 on page 4–11.)

3. Send a line terminator, either a Line Feed (LF, 0A hex) or a Form Feed (FF, 0C hex). A Carriage Return (CR) may also be used instead of the LF code, provided the Carriage Return has been configured for Carriage Return = Carriage Return + Line Feed (CR = CR + LF).

    a. A line feed (0A hex) used as the line terminator plots the contents of the buffer and advances the paper a *single dot row,* based on the vertical density of the current mode.

    b. A form feed (0C hex) used as the line terminator plots the contents of the buffer and advances the paper to the *top of the next form.*

4. Regardless of which line terminator code is sent, the printer defaults to the previously selected print mode unless further plot control codes are provided with the data.

    NOTE: Failure to adhere to this format may cause unexpected results.

DOUBLE DENSITY PLOT

For double density plot, the plot line contains: Control Code 04 hex, plot data bytes, a Line Terminator (0A hex or 0C hex), Control Code 05 hex, plot data bytes, and a Line Terminator. The control sequence for sending P–Series **Double Density Plot** is as follows:

1. Send the even dot plot control code EOT (04 hex), followed by plot data bytes. (Refer to Table 4–1 on page 4–11.)

2. Send a line terminator, which causes the printer to plot the data bytes. The paper is *not* advanced in Double Density Plot; the printer now waits for the second plot command and plot data bytes.

3. Send the odd dot plot control code ENQ (05 hex) and a second line of data, followed by a line terminator.

    a. A line feed (0A hex) used as the line terminator plots the contents of the buffer and advances the paper a *single dot row*, based on the vertical density of the current mode. A CR (if CR = CR + LF is configured) may also be used with the same result.

    b. A form feed (0C hex) used as the line terminator plots the data bytes and advances the paper to the *top of the next form.*

4. Regardless of which line terminator code is sent, the printer defaults to the previously selected print mode unless further plot control codes are provided with the data.

    NOTE: Failure to adhere to this format may cause unexpected results.

Plotting the Data

P–Series Plot Mode plots the image from the horizontal bit pattern. Figure 4–8 duplicates the pattern shown in Figure 4–4 but is modified for Odd Dot Plot. Eight dot rows are required, two characters per row, six columns per character. (The dots required to produce the pattern are shown Figure 4–9 on page 4–10.)

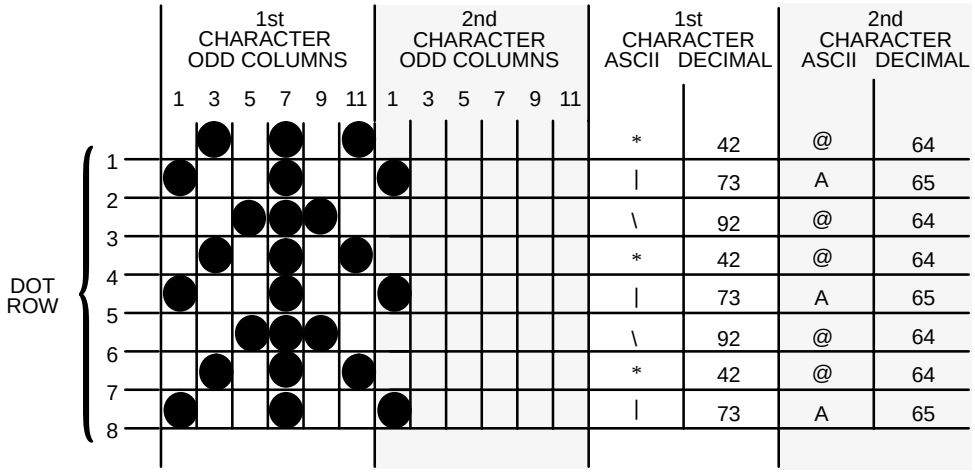


Figure 4–8. Odd Dot Plot Pattern Plan

The following program uses the Odd Dot Plot control code to produce the image.

```
10 LPRINT "Odd Dot Plot"
20 FOR I=1 TO 8
30 READ R1
40 READ R2
50 LPRINT CHR$(5);
60 FOR N=1 TO 25
70 LPRINT CHR$(R1);CHR$(R2);
80 NEXT N
90 LPRINT
100 NEXT I
110 DATA 42, 64, 73, 65, 92, 64, 42, 64, 73, 65, 92, 64, 42, 64, 73, 65
120 LPRINT
```

- The image is printed 25 times as shown in Figure 4–9.
- An entire dot row is plotted in one printing pass. Consequently, the first row of all 25 images is printed in one pass, followed by the second row, etc, until all rows have been printed.

Figure 4–9. Sample Odd Dot Plot

Table 4–1. Plot Data Byte Dot Patterns

BINARY	OCT	DEC	HEX	ASCII	2 4 6 8 10 12 1 3 5 7 9 11	BINARY	OCT	DEC	HEX	ASCII	2 4 6 8 10 12 1 3 5 7 9 11	BINARY	OCT	DEC	HEX	ASCII	2 4 6 8 10 12 1 3 5 7 9 11
0100000	040	32	20	Space	○○○○○●	1000000	100	64	40	@	○○○○○○	1100000	140	96	60	‘	○○○○○●
0100001	041	33	21	!	●○○○○●	1000001	101	65	41	A	●○○○○○	1100001	141	97	61	a	●○○○○●
0100010	042	34	22	”	○●○○○●	1000010	102	66	42	B	○●○○○○	1100010	142	98	62	b	○●○○○●
0100011	043	35	23	#	●●○○○●	1000011	103	67	43	C	●●○○○○	1100011	143	99	63	c	●●○○○●
0100100	044	36	24	$	○○●○○●	1000100	104	68	44	D	○○●○○○	1100100	144	100	64	d	○○●○○●
0100101	045	37	25	%	●○●○○●	1000101	105	69	45	E	●○●○○○	1100101	145	101	65	e	●○●○○●
0100110	046	38	26	&	○●●○○●	1000110	106	70	46	F	○●●○○○	1100110	146	102	66	f	○●●○○●
0100111	047	39	27	’	●●●○○●	1000111	107	71	47	G	●●●○○○	1100111	147	103	67	g	●●●○○●
0101000	050	40	28	(	○○○●●●	1001000	110	72	48	H	○○○●○○	1101000	150	104	68	h	○○○●○●
0101001	051	41	29	)	●○○●●●	1001001	111	73	49	I	●○○●○○	1101001	151	105	69	i	●○○●○●
0101010	052	42	2A	*	○●○●●●	1001010	112	74	4A	J	○●○●○○	1101010	152	106	6A	j	○●○●○●
0101011	053	43	2B	+	●●○●●●	1001011	113	75	4B	K	●●○●○○	1101011	153	107	6B	k	●●○●○●
0101100	054	44	2C	,	○○●●●●	1001100	114	76	4C	L	○○●●○○	1101100	154	108	6C	l	○○●●○●
0101101	055	45	2D	–	●○●●●●	1001101	115	77	4D	M	●○●●○○	1101101	155	109	6D	m	●○●●○●
0101110	056	46	2E	.	○●●●●●	1001110	116	78	4E	N	○●●●○○	1101110	156	110	6E	n	○●●●○●
0101111	057	47	2F	/	●●●●●●	1001111	117	79	4F	O	●●●●○○	1101111	157	111	6F	o	●●●●○●
0110000	060	48	30	0	○○○○●●	1010000	120	80	50	P	○○○○●○	1110000	160	112	70	p	○○○○●●
0110001	061	49	31	1	●○○○●●	1010001	121	81	51	Q	●○○○●○	1110001	161	113	71	q	●○○○●●
0110010	062	50	32	2	○●○○●●	1010010	122	82	52	R	○●○○●○	1110010	162	114	72	r	○●○○●●
0110011	063	51	33	3	●●○○●●	1010011	123	83	53	S	●●○○●○	1110011	163	115	73	s	●●○○●●
0110100	064	52	34	4	○○●○●●	1010100	124	84	54	T	○○●○●○	1110100	164	116	74	t	○○●○●●
0110101	065	53	35	5	●○●○●●	1010101	125	85	55	U	●○●○●○	1110101	165	117	75	u	●○●○●●
0110110	066	54	36	6	○●●○●●	1010110	126	86	56	V	○●●○●○	1110110	166	118	76	v	○●●○●●
0110111	067	55	37	7	●●●○●●	1010111	127	87	57	W	●●●○●○	1110111	167	119	77	w	●●●○●●
0111000	070	56	38	8	○○○●●●	1011000	130	88	58	X	○○○●●○	1111000	170	120	78	x	○○○●●●
0111001	071	57	39	9	●○○●●●	1011001	131	89	59	Y	●○○●●○	1111001	171	121	79	y	●○○●●●
0111010	072	58	3A	:	○●○●●●	1011010	132	90	5A	Z	○●○●●○	1111010	172	122	7A	z	○●○●●●
0111011	073	59	3B	;	●●○●●●	1011011	133	91	5B	[	●●○●●○	1111011	173	123	7B	{	●●○●●●
0111100	074	60	3C	<	○○●●●●	1011100	134	92	5C	\	○○●●●○	1111100	174	124	7C	|	○○●●●●
0111101	075	61	3D	=	●○●●●●	1011101	135	93	5D	]	●○●●●○	1111101	175	125	7D	}	●○●●●●
0111110	076	62	3E	>	○●●●●●	1011110	136	94	5E	^	○●●●●○	1111110	176	126	7E	~	○●●●●●
0111111	077	63	3F	?	●●●●●●	1011111	137	95	5F	—	●●●●●○	1111111	177	127	7F	Delete	●●●●●●

To Exit the P–Series Plot Mode

When returning to the print mode from the P–Series Plot Mode, include an extra line feed in the data stream to maintain proper print line registration relative to the last line of plot graphics. If the extra line feed is not included, the first character line after the graphics data may be truncated, as shown in Figure Figure 4–10.

In this example, a text line follows plot data, preceded by a single line terminator code. (Text characters extend into the range of the previously printed plot line and appear truncated.)

This example shows a text line fol–lowing plot data, but preceded by an *additional* line terminator code. (Char-acters are able to be printed full–height.)

Figure 4–10. Truncated Character Line

Combining Graphics and Text

The printer can combine Serial Matrix Bit Image graphics and characters (text) on the same line. P–Series graphics and printable symbols cannot be intermixed on the same line.

CHAPTER 5
VERTICAL FORMAT UNITS

Introduction

The P3000 Series printers includes two vertical format units: *Printronix* standard Electronic Vertical Format Unit (EVFU) and Dataproducts Direct Access Vertical Format Unit (DVFU). Although not a "true" VFU, a vertical tab table is provided for forms control in Serial Matrix protocol. All VFUs are available only in P–Series protocol and are enabled from the control panel, and the Serial Matrix vertical tabs feature is always enabled in Serial Matrix protocol. This chapter describes:

General VFU Programming

A VFU provides an efficient way to slew paper rapidly during repetitive printing tasks. The type of VFU used is a configuration option selected from the control panel. If not used, disable the VFU option from the control panel.

The general VFU programming procedure is as follows:

1. Design a form, determining spacing and channel assignments for each line.

2. Send the programming sequence to the host. The sequence depends on the type of VFU used.

Some VFUs require the Paper Instruction (PI) line normally associated with the Dataproducts parallel interface. Note that data bit 8 of the standard RS–232 interface can be configured for use as the PI line.

The following information applies when programming and using a VFU:

Elongated Characters – Elongated (double high) characters can be used within VFU programs. The VFU automatically counts one line of elongated characters as two normal character lines.

Paper Runaway Protection – If the VFU is selected but not loaded when a VFU command is sent from the host computer, the printer will move the paper a single line feed. If the VFU is selected and the memory has been loaded, a channel code sent from the host, which is not a part of the assigned sequence currently in memory, will move the paper a single line feed.

Line Spacing – The printer can use any line spacing with the VFU. The VFU determines the forms length according to the program specifications and the currently selected line spacing. Line spacing may be mixed on the same form; however, do so with caution to avoid unpredictable results.

VFU Deselected – If any VFU is deselected from the control panel, the VFU data is ignored and the forms length definition returns to the previously set value. The current print position becomes the top–of–form.

VFU Load/Save/Clear

Save one VFU table at a time in Non–Volatile Memory (NVM). The VFU table format is: VFU type, LPI, and VFU channel data.

Load – Upon printer powerup or printer reset, a previously saved VFU loads if the saved *VFU table* matches the *VFU type* (see page 3–16). Upon loading the VFU, LPI sets to the value stored in the VFU table if the saved VFU was loaded using the 6 or 8 lpi DVFU.

Save – From the control panel, VFU TABLE SAVE writes the current VFU table into Non–Volatile memory. Skip–over perforation and forms length values are not saved from this selection.

Clear – Clear the VFU by pressing ENTER at the VFU TABLE CLEAR configuration menu, control code (SFCC @), changing printer protocol, changing VFUs, loading parameters, or by loading a new VFU format. When DISABLE is selected as the VFU type, the previously loaded VFU data is *not* cleared and is still in effect if reselected.

P–Series EVFU

The EVFU can be selected in P–Series protocol. The EVFU provides 16 channels to identify up to 192 lines. The programming sequence follows this order: 1) start load code, 2) line identification code, and 3) end load code.

Start Load Code – 1E or 6E Hex

The start load code clears and initializes the EVFU memory for the memory load program. The start load code is 1E hex when the PI line is disabled (low) or 6E hex when the PI line is enabled (high).

Channel Assignment

The EVFU memory has the capacity for 192–line forms. The first line identification code (channel code) in the memory load program defines the first line on the form; the second line identification code defines the second line on the form, etc. Each line must have a line identification code.

Filler channel codes are used for lines not accessed by the print program. Use any channel code as a filler except channel code 1, which is reserved for the top–of–form, and channel code 12, which is reserved as the vertical tab channel. Repeat the same filler channel code as necessary for any number of lines.

Channel 1 – The top–of–form code, reserved as the first line on the form or the first line printed (top–of–form position). The operating program sends the channel 1 code to advance to the top of the next form. After the memory is loaded, a Form Feed code (FF, 0C hex) moves the paper to the next channel 1 (top–of–form).

Channels 2 through 11, 13 and 14 – Used as general channel codes (line identification codes) or filler channels. Identify each line on the form with a channel code. When the operating program sends the channel code, the paper advances to the line identified by the channel code. Lines not used by the operating program must also be identified by filler channels (unused channel codes).

Channel 12 – Reserved as the Vertical Tab channel. The Vertical Tab code (VT, 0B hex) prints any data in the print buffer and rapidly slews the paper to the next line identified by the channel 12 code. If channel 12 is not loaded in the EVFU memory, a single line feed is executed when a VT code is sent.

Channel 15 and 16 – Used as general channel codes or filler channels only when the VFU is accessed by the PI line. In an EVFU form that does not use the PI line, the codes for Channels 15 and 16 function as the Start Load and End Load codes.

End Load – 1F or 6F Hex

The end load code terminates the memory load program. The end load code is 1F hex when the PI line is disabled (low) or 6F hex when the PI line is high. Channel codes in excess of 192 channels received prior to the end load code are discarded.

Using the EVFU

Once the EVFU program has been enabled and loaded, the VFU LOADED indicator on the control panel glows. Sending the appropriate channel code to the printer causes any data in the buffer to print and slew the paper to the next line on the form having the specified channel number assigned in EVFU memory.

To recognize a data byte as an EVFU instruction, the following criteria must be met:

1. The PI line must be enabled and set high; and

2. Data bit 5 must be 0 (not set).

OR:

1. The PI line must be disabled or low; and

2. Data bit 5 must be 1 (set).

Given these conditions, the lower four bits of a byte will specify the EVFU channel number. Table 5–1 lists the EVFU channels and their equivalent data bytes with the PI line enabled; Table 5–2 lists the EVFU channel and their equivalent data bytes with the PI line disabled.

Table 5–1. P–Series EVFU Codes – PI Line Enabled

ASCII				Data Bits								Channel
Hex	**Dec**	**Code**	**PI**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
00	0	NUL	1	X	X	X	0	0	0	0	0	1 (TOF)
01	1	SOH	1	X	X	X	0	0	0	0	1	2
02	2	STX	1	X	X	X	0	0	0	1	0	3
03	3	ETX	1	X	X	X	0	0	0	1	1	4
04	4	EOT	1	X	X	X	0	0	1	0	0	5
05	5	ENQ	1	X	X	X	0	0	1	0	1	6
06	6	ACK	1	X	X	X	0	0	1	1	0	7
07	7	BEL	1	X	X	X	0	0	1	1	1	8
08	8	BS	1	X	X	X	0	1	0	0	0	9
09	9	HT	1	X	X	X	0	1	0	0	1	10
0A	10	LF	1	X	X	X	0	1	0	1	0	11
0B	11	VT	1	X	X	X	0	1	0	1	1	12 (VT)
0C	12	FF	1	X	X	X	0	1	1	0	0	13
0D	13	CR	1	X	X	X	0	1	1	0	1	14
0E	14	SO	1	X	0	0	0	1	1	1	0	15
0F	15	SI	1	X	0	0	0	1	1	1	1	16
6E	110	n	1	X	1	1	0	1	1	1	0	Start Load
6F	111	o	1	X	1	1	0	1	1	1	1	End Load
X = Undefined, 0 or 1						1 = High						0 = Low

NOTE: Disabling or enabling the PI interface line is configuration controlled.

Table 5–2. P–Series EVFU Codes – PI Line Disabled or Not Used

ASCII			Data Bits								Channel
Hex	**Dec**	**Code**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
10	16	DLE	0	0	0	1	0	0	0	0	1 (TOF)
11	17	DC1	0	0	0	1	0	0	0	1	2
12	18	DC2	0	0	0	1	0	0	1	0	3
13	19	DC3	0	0	0	1	0	0	1	1	4
14	20	DC4	0	0	0	1	0	1	0	0	5
15	21	NAK	0	0	0	1	0	1	0	1	6
16	22	SYN	0	0	0	1	0	1	1	0	7
17	23	ETB	0	0	0	1	0	1	1	1	8
18	24	CAN	0	0	0	1	1	0	0	0	9
19	25	EM	0	0	0	1	1	0	0	1	10
1A	26	SUB	0	0	0	1	1	0	1	0	11
1B	27	ESC	0	0	0	1	1	0	1	1	12 (VT)
1C	28	FS	0	0	0	1	1	1	0	0	13
1D	29	GS	0	0	0	1	1	1	0	1	14
1E	30	RS	0	0	0	1	1	1	1	0	Start Load
1F	31	US	0	0	0	1	1	1	1	1	End Load
X = Undefined, 0 or 1						1 = High					0 = Low

NOTE: The ESC code cannot be used simultaneously as the EVFU VT code and the Special Function Control Character (SFCC). If ESC is used as the SFCC, the EVFU must be used with the PI line enabled and set high. Refer to the Configuration chapter for more information on the SFCC.

Clearing the EVFU Memory

Following one of these actions resets (clears) the EVFU memory.

- Sending only the start load code.
- Sending a start load code followed immediately by an end load code.
- Sending a second start load code, which reinitializes the EVFU. (This restarts the host data.)

When the EVFU memory is cleared, the forms length returns to the previously set value and the current print position becomes the top–of–form.

Relative Line Slewing

Another method of moving paper using the PI line results in vertical slews of a specified number of lines within the form relative to the current print line (rather than slewing to a specific line). For this to occur, three criteria must be met:

- The PI line must be enabled and set high;
- Data bit 5 must be 1 (set); and
- The EVFU must be the selected Vertical Format Unit.

The Slew Relative configuration and the status of data bits 1–4 determine the number of lines slewed as described in Table 5–3. (Note that the state of data bit 5 is the difference between line slewing and using the interface lines as EVFU channel codes.) As long as the EVFU is selected, this type of vertical paper motion will occur, regardless of whether the EVFU memory is loaded or not.

If the Double High for One Line attribute is active, **n** + 1 lines are slewed rather than **n** lines.

Table 5–3. P–Series EVFU Line Slewing

ASCII				Data Bits								Lines Slewed
Hex	**Dec**	**Code**	**PI**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
10	16	DLE	1	X	X	X	1	0	0	0	0	1
11	17	DC1	1	X	X	X	1	0	0	0	1	2
12	18	DC2	1	X	X	X	1	0	0	1	0	3
13	19	DC3	1	X	X	X	1	0	0	1	1	4
14	20	DC4	1	X	X	X	1	0	1	0	0	5
15	21	NAK	1	X	X	X	1	0	1	0	1	6
16	22	SYN	1	X	X	X	1	0	1	1	0	7
17	23	ETB	1	X	X	X	1	0	1	1	1	8
18	24	CAN	1	X	X	X	1	1	0	0	0	9
19	25	EM	1	X	X	X	1	1	0	0	1	10
1A	26	SUB	1	X	X	X	1	1	0	1	0	11
1B	27	ESC	1	X	X	X	1	1	0	1	1	12
1C	28	FS	1	X	X	X	1	1	1	0	0	13
1D	29	GS	1	X	X	X	1	1	1	0	1	14
1E	30	RS	1	X	0	0	1	1	1	1	0	15
1F	31	US	1	X	0	0	1	1	1	1	1	16
X = Undefined, 0 or 1						1 = High						0 = Low

DVFU

The DVFU may be selected in P–Series protocol and is generally used in conjunction with the Dataproducts interface. A maximum of 12 channels can be assigned to each physical line of a form—up to 143 lines. A channel number is assigned to each line on the form. The host computer sends channel codes to the printer, resulting in rapid paper slewing to the next corresponding line. The programming sequence follows this order: 1) start load code, 2) channel assignments, and 3) end load code.

The DVFU start load codes are either 6C, 6D, or 6E hex *with* the PI line high.

Start Load Code – 6C, 6D, or 6E Hex

6E Hex – The DVFU start load code of 6E (hex) with the PI line high initiates the DVFU memory load routine using the current printer line spacing as the DVFU line spacing.

6C Hex – The DVFU start load code of 6C (hex) with the PI line high initiates the DVFU memory load routine using 6 lpi as the line spacing, regardless of the current printer line spacing.

6D Hex – The DVFU start load code of 6D (hex) with the PI line high initiates the DVFU memory load routine using 8 lpi as the line spacing, regardless of the current printer line spacing.

Channel Assignment

Following the start load code, all data bytes received are interpreted as channel assignment data until the end load code is received. During the channel assignment portion of the load routine, the PI line can be high or low; if high, however, the channel data *cannot* be the same as start or end load code data. The last channel 12 loaded is assigned Bottom–of–Form (BOF). If skip–over perforation is enabled, slewing will occur from the bottom of the form to the top of the form.

A maximum of 12 channels can be assigned to one physical line on the form (multiple channels per line facilitate the use of a single DVFU load for multiple forms). Two eight–bit data bytes (DVFU characters) are required per line. As shown in Table 5–4, the least significant six bits of the first data byte are used to assign channels 1 through 6; the least significant six bits of the second data byte are used to assign channels 7 through 12. If a bit is set, the corresponding channel is assigned.

Each line on the form requires two bytes. For lines not requiring a channel identification, the two bytes should not contain channel assignments.

A maximum of 143 lines (286 DVFU bytes) can be assigned on the form. If the printer receives more than 286 bytes without an end load code, the end load code is “forced” and the load routine is terminated.

CH 1 TOF – The first channel, line 1 of the form, *must* be assigned channel 1, top–of–form, or the entire load sequence is ignored and the memory reset. Consequently, when preparing to load the DVFU memory, position the paper at the required top–of–form position in anticipation of sending the TOF channel assignment code as the first line loaded. After the memory is loaded, a Form Feed code (FF, 0C hex) moves the paper to the next channel 1 (top–of–form).

CH 2 VT – Channel 2 is designated as the vertical tab channel. After the memory is loaded, a VT code (0B hex) moves the paper to the next channel 2. If the printer receives a VT code but channel 2 is not loaded, the paper advances a single line at the current line spacing.

CH 12 BOF – The last channel 12 loaded is used as the Bottom–of–Form (BOF) channel and has significance when using the printer skip–over perforation feature. When skip–over perforation is enabled, paper skips from BOF to TOF *only* if at the BOF position. If a channel search moves paper past the BOF position but before the TOF position, no skip–over perforation will occur.

Table 5–4. DVFU Channel Assignment

First Data Byte			Second Data Byte		
Binary Value	**Bit #**	**Channel #**	**Binary Value**	**Bit #**	**Channel #**
128	8	X (don't care)	128	8	X (don't care)
64	7	X (don't care)	64	7	X (don't care)
32	6	6	32	6	12 – BOF
16	5	5	16	5	11
8	4	4	8	4	10
4	3	3	4	3	9
2	2	2 – VT	2	2	8
1	1 (LSB)	1 – TOF	1	1 (LSB)	7

End Load Code – 6F Hex

The DVFU end load code is 6F (hex) with the PI line high. This terminates the DVFU memory load routine.

Using the DVFU

The VFU LOADED indicator on the control panel glows when the DVFU program has been enabled and loaded. Sending an appropriate channel code to the printer causes any data in the buffer to print and slew the paper to the next line on the form having the specified channel number assigned in DVFU memory. To recognize a data byte as a DVFU channel instruction, the following criteria must be met:

1. The PI line must be enabled and set high; and

2. Data bit 5 must be 0 (not set).

Given these conditions, the lower four bits of a byte will specify the DVFU channel number. Table 5–5 lists DVFU channels and their equivalent data bytes.

Table 5–5. DVFU Channel Instruction

ASCII				Data Bits								Channel
Hex	**Dec**	**Code**	**PI**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
00	0	NUL	1	X	X	X	0	0	0	0	0	1
01	1	SOH	1	X	X	X	0	0	0	0	1	2
02	2	STX	1	X	X	X	0	0	0	1	0	3
03	3	ETX	1	X	X	X	0	0	0	1	1	4
04	4	EOT	1	X	X	X	0	0	1	0	0	5
05	5	ENQ	1	X	X	X	0	0	1	0	1	6
06	6	ACK	1	X	X	X	0	0	1	1	0	7
07	7	BEL	1	X	X	X	0	0	1	1	1	8
08	8	BS	1	X	X	X	0	1	0	0	0	9
09	9	HT	1	X	X	X	0	1	0	0	1	10
0A	10	LF	1	X	X	X	0	1	0	1	0	11
0B	11	VT	1	X	X	X	0	1	0	1	1	12
X = Undefined, 0 or 1						1 = High						0 = Low

Clearing the DVFU Memory

Following one of these actions resets (clears) the DVFU memory.

- Sending only the start load and end load codes (no channel assignment data).
- Sending an odd number of DVFU characters (channel assignment data). (The printer detects the characters after it receives the end load code.) Remember, two data bytes are required per line.
- Sending a second start load code, which reinitializes the DVFU. (This restarts the host data)
- Sending the first byte (after the start load) that does not specify top–of–form.

The DVFU data is ignored if the DVFU has not been selected from the control panel. Deselecting the DVFU returns the forms length to the previously set value and the current print position becomes the top–of–form.

Relative Line Slewing

Another method of moving paper using the PI line results in vertical slews of a specified number of lines within the form relative to the current print line (rather than slewing to a specific line). For this to occur, three criteria must be met:

1. The PI line must be set high;
2. Data bit 5 must be 1 (set); and
3. The DVFU must be the selected Vertical Format Unit.

The Slew Relative configuration and the status of data bits 1 through 4 determine the number of lines slewed as described in Table 5–6. (Note that the state of data bit 5 is the difference between line slewing and using the interface lines as DVFU channel codes.) As long as the DVFU is selected, this type of vertical paper motion will occur, regardless of whether the DVFU memory is loaded or not.

If the Double High for One Line attribute is active, **n** + 1 lines are slewed rather than **n** lines.

Table 5–6. P–Series DVFU Line Slewing

ASCII				Data Bits								Lines Slewed
Hex	**Dec**	**Code**	**PI**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
10	16	DLE	1	X	X	X	1	0	0	0	0	0 = CR*
11	17	DC1	1	X	X	X	1	0	0	0	1	1
12	18	DC2	1	X	X	X	1	0	0	1	0	2
13	19	DC3	1	X	X	X	1	0	0	1	1	3
14	20	DC4	1	X	X	X	1	0	1	0	0	4
15	21	NAK	1	X	X	X	1	0	1	0	1	5
16	22	SYN	1	X	X	X	1	0	1	1	0	6
17	23	ETB	1	X	X	X	1	0	1	1	1	7
18	24	CAN	1	X	X	X	1	1	0	0	0	8
19	25	EM	1	X	X	X	1	1	0	0	1	9
1A	26	SUB	1	X	X	X	1	1	0	1	0	10
1B	27	ESC	1	X	X	X	1	1	0	1	1	11
1C	28	FS	1	X	X	X	1	1	1	0	0	12
1D	29	GS	1	X	X	X	1	1	1	0	1	13
1E	30	RS	1	X	0	0	1	1	1	1	0	14
1F	31	US	1	X	0	0	1	1	1	1	1	15
X = Undefined, 0 or 1							1 = High					0 = Low
**treated as CR = CR; refer to the Carriage Return control code on page 6–16.*												

Serial Matrix Vertical Formatting

In Serial Matrix protocol, vertical formatting is always enabled. Forms control is accomplished by a set of programmed vertical tabs. Various lines of the form are assigned vertical tabs which are then accessed by control code for rapid paper advancement to the tab position. Two codes are used for controlling vertical tabs: ESC B for single channel tab setting and VT to execute a vertical tab. These codes and their parameters are described in the Programming chapter. The VFU Loaded indicator on the control panel will not glow when vertical tabs are loaded for forms control.

Vertical Tab Positions

Vertical tab positions are assigned to a line number. A maximum of 16 vertical tab positions can be assigned on the form. A sample format is shown in Figure 5–1. The first vertical tab is assigned line 6 for part number data, a second tab is assigned line 8 for part name data, and a third tab is assigned line 14 for quantity data.

The ESC B code is used to assign the vertical tabs to the lines of the form. Once the tab positions are assigned, sending the vertical tab execute code (VT) causes the paper (currently at the top–of–form position) to advance to the first tab position for PART NUMBER data. Sending another VT moves the paper to the second tab position for PART NAME, followed by a third VT to access the third tab position for QUANTITY data.

Form Data	Form Line Number	Vertical Tabs
	1	Top of Form
	2	
	3	
	4	
	5	
PART NUMBER	6	Tab 1
	7	
PART NAME	8	Tab 2
	9	
	10	
	11	
	12	
	13	
QUANTITY	14	Tab 3
	15	
	↓	
	20	

Figure 5–1. Sample Serial Matrix Vertical Tab Positions

Executing Vertical Tabs

The vertical tab execute code is VT. When sent, it prints the contents of the print buffer (if data is in the buffer) and causes paper movement to the next predefined vertical tab position. If a tab position is not defined, the paper is moved to the next line at the current line spacing. If a tab position is at the current line, the paper is moved to the next tab position. If no tab positions are defined between the current line and the end of the form, the paper moves to the next top–of–form.

CHAPTER 6

PROGRAMMING

Introduction

You can configure the printer from the control panel to respond to control codes in one of two standard protocols: *Printronix* P–Series or Serial Matrix. If equipped with the Intelligent Graphics Processor (IGP) option, the printer responds to the Special Function Control Character and IGP commands as described in the IGP User's Reference Manual. This programming chapter describes:

Overstrike/Overlay Mode

You can underline or overstrike data in the print buffer when the carriage return code (hex 0D) is configured for carriage return only (*not* carriage return and line feed). Any printable characters in the data stream can overstrike printable characters or spaces already loaded in the print buffer as long as a paper motion command (i.e., line feed, form feed) has not been received. The printer is in the Overstrike Mode when configured from the control panel for OVERSTRIKE ENABLE. This mode causes the printer to double strike any dots following the carriage return that lay on top of dots placed *before* the carriage return. To make a character bold, send the character, a carriage return, and the character again.

The printer is in the Overlay Mode when configured from the control panel with OVERSTRIKE DISABLE. The Overlay Mode causes dots following the carriage return to lay on top of existing data received before the carriage return. (No dots will double strike.) The Overlay Mode results in faster printing because it does not have to strike dots twice; however, the Overlay Mode does not allow character bolding with the use of carriage returns. An example of overstrike/overlay and underlining characters is shown in Figure 6–1.

Enter in Print Buffer	Printed Result
P3000 SERIES PRINTER (CR)	
SS/// (CR)	
_____ (LF)	P3000 SERIES PRINTER

S = Space (20 Hex) CR = Carriage Return (0D Hex)*
LF = Line Feed (0A Hex) _ = Underline (5F Hex)

** NOTE: The printer must be configured for CR=CR only. If configured for a carriage return and line feed on receipt of the CR code, the contents of the buffer will print.*

Figure 6–1. Overstrike/Overlay and Underline Examples

Control Code Functions

The following information is listed for each code function (where applicable and possible).

ASCII Mnemonic – The standard American Standard Code for Information Interchange (ASCII) name for the control code.

Hex Code – The code's numeric equivalent in hexadecimal.

Decimal Code – The code's numeric equivalent in decimal.

Purpose – The function(s) of the control code.

Comment – A description of exceptions or limitations to normal use.

A sample **Expression** written in BASIC programming language is provided for some control codes when a specific syntax is required to complete the program statement (i.e.,: Bit Image modes, Download a Language, Horizontal Tab Set, Vertical Tab Set). The programs in this chapter were run on an IBM Personal Computer using Microsoft GW–BASIC version 3.22.

Special Function Control Code – Control Code Header

A Special Function Control Code (SFCC) is used to extend the control code protocol. The SFCC is the control code introducer (or header); it is the first input in the sequence of parameters. The general control code sequence is:

(SFCC)(parameter 1)(parameter 2)...(parameter n)

P–Series codes can use SOH, ETX, ESC, ^ ("hat") or ~ ("tilde") as control code introducers. For example, you can enable bold print in the P–Series protocol using any of the following control code introducers:

ASCII:	SOH G	**Hex:**	01 47	**BASIC:**	CHR$(1);"G";
	ETX G		03 47		CHR$(3);"G";
	ESC G		1B 47		CHR$(27);"G";
	^ G		5E 47		CHR$(94);"G";
	~ G		7E 47		CHR$(126);"G";

Serial Matrix codes use *only* ESC as the control code introducer. For example, to enable bold print in the Serial Matrix printer protocol, use the Serial Matrix SFCC and the bold print control code character G as follows:

ASCII:	ESC G	**Hex:**	1B 47	**BASIC:**	CHR$(27);"G";

The SFCC is selected from the control panel. To select the SFCC for your application, refer to the Application Compatibility diagrams in the Configuration chapter.

Most programming examples in this chapter have been created using the ESC control code introducer.

NOTE: SFCC commands must be terminated by a semicolon (;) in a BASIC program or by text following the command string. A paper motion command directly following a special function code command may result in erroneous paper movement.

You can control print format, print mode, or international language selection by a longer sequence known as a Command Line. Command Lines are "string" type commands placed between complete lines of text and affect the text which follows. The printer has six Command Lines: PMODE, OSET, PSET, LPI, LINES, and INCHES. Each of these Command Lines is discussed in this chapter under the appropriate Control Code function.

For example, when in P–Series emulation, you can set the form length in inches using the following command line:

SFCC INCHES;n.f

where: "n" is the whole number of inches, and "f" is the fractional increment in 0.5" increments.

When using the SFCC in a Command Line, the SFCC must be the first non–blank symbol in the line ("space," hex 20, is a blank symbol). In addition, characters following spaces (other than a valid line terminator) in a Command Line are ignored so that you can include program comments on the Command Line. Valid line terminators are: Form Feed (FF), Line Feed (LF), and Carriage Return (CR). The valid line terminator does not produce paper motion. If a Command Line contains an error, the command is not executed, and the line truncates to include any of the following error messages:

Command Line Error Messages

Error Message	Explanation
INVALID PARAMETER	*The command received cannot be interpreted correctly, or the correct command is not followed by an expected delimiter.*
PARAMETER OUT OF BOUNDS	*A decimal parameter in the command is out of range.*
MISSING PARAMETER	*One or more necessary parameters is missing from the command.*
ILLEGAL CHARACTER IN DECIMAL PARAMETER	*A decimal parameter contains a non–numeric character, or a fractional digit is out of range.*
TOO MANY DIGITS IN DECIMAL PARAMETER	*A decimal parameter contains too many digits.*

Attribute Set and Reset Codes

Certain print attributes are set and reset (turned on or off) by using the appropriate ESC or SFCC code sequence and the values 1 or 0. These values may be either the hexadecimal code 01 and 00, or the ASCII code for the printable symbols of decimal 1 and 0 (hexadecimal code 31 and 30, respectively). Expanded Print, Super/Subscript Print, and Underline are attributes which are set/reset in this fashion.

Control Code Reference Index

The following index lists the control codes by function and lists the ASCII mnemonic and page number. Alphabetical listings by mnemonic and function are provided in Appendix D.

NOTE: Some control code functions can be accomplished using another control code sequence or via control panel selection.

PAPER MOTION

FUNCTION	P–SERIES	SERIAL	PAGE NO.
Form Feed	FF	FF	6–40
Line Feed	LF	LF	6–45
Line Feed n/216 Inch (1 line only)	N/A	ESC J	6–46
Vertical Tab	VT	VT	6–68

FORMAT

FUNCTION	P–SERIES	SERIAL	PAGE NO.
Backspace	BS	BS	6–7
Cancel	N/A	CAN	6–15
Carriage Return	CR	CR	6–16
Delete	N/A	DEL	6–30
Forms Length Set (Inches)	SFCC INCHES	ESC C NUL	6–41
Forms Length Set (Lines)	SFCC LINES	ESC C	6–42
Horizontal Tab	N/A	HT	6–43
Horizontal Tab Set	N/A	ESC D	6–44
Line Spacing 1/6 Inch (6 lpi)	SFCC 2 SFCC LPI	ESC 2	6–47
Line Spacing 1/8 Inch (8 lpi)	SFCC 0 SFCC LPI	ESC 0	6–48
Line Spacing 8 or 10.3 lpi (1 line only)	ACK SFCC f	N/A	6–49
Line Spacing 7/72 Inch	SFCC 1	ESC 1	6–50
Line Spacing n/72 Inch (as executed by ESC 2)	SFCC A	ESC A	6–51
Line Spacing n/216 Inch	SFCC 3	ESC 3	6–52
Skip–Over Perforation	N/A	ESC N	6–62
Skip–Over Perforation Cancel	N/A	ESC O	6–63
VFU Commands (P–Series)	DLE–US	N/A	6–67
Vertical Tab Set/Clear (Serial Matrix)	N/A	ESC B	6–69

PRINT MODE

FUNCTION	P–SERIES	SERIAL	PAGE NO.
Bold Print	SFCC G	ESC G	6–13
Bold Print (1 line only)	SFCC j		6–13
Bold Print Reset	SFCC H	ESC H	6–14
Condensed Print	N/A	SI ESC SI	6–28
Condensed Print Reset	N/A	DC2	6–29
Character Pitch 10 cpi	N/A	ESC P	6–17
Character Pitch 12 cpi	N/A	ESC M ESC :	6–18 6–18
Elongated (Double High) Print (1 line)	SFCC h BS	ESC h	6–33
Emphasized Print	SFCC E	ESC E	6–34
Emphasized Print Reset	SFCC F	ESC F	6–35
Expanded (Double Wide) Print	SFCC W	ESC W	6–36
Expanded (Double Wide) Print Reset	SFCC W	ESC W DC4	6–36
Expanded (Double Wide) Print (1 line)	SFCC k	SO ESC SO	6–37
Overscoring	SFCC _	ESC _	6–53
Print Mode/Pitch Selection 6–57		SFCC X	ESC X
	SFCC PMODE		
Print Mode/Pitch Selection (MVP)	SFCC [	ESC [	6–59
Superscript/Subscript Printing	SFCC S	ESC S	6–64
Superscript/Subscript Printing Reset	SFCC T	ESC T	6–65
Underline	SFCC –	ESC –	6–66

GRAPHICS

FUNCTION	P–SERIES	SERIAL	PAGE NO.
Bit Image Mode, Double Density	N/A	ESC L	6–10
Bit Image Mode, Double Density/Speed	N/A	ESC Y	6–11
Bit Image Mode, Quadruple Density	N/A	ESC Z	6–12
Bit Image Mode, Single Density	N/A	ESC K	6–9
Plot, Even Dot (High Density)	EOT SFCC d	N/A	6–54
Plot, Odd Dot (Normal Density)	ENQ SFCC e	N/A	6–55

OTHER FUNCTIONS

FUNCTION	P–SERIES	SERIAL	PAGE NO.
Bell	BEL	BEL	6–8
Character Set Select	SFCC l	ESC l	6–19

OTHER FUNCTIONS (continued)

FUNCTION	P–SERIES	SERIAL	PAGE NO.
Character Set Select (Control Codes)		SFCC 7	ESC 7	6–22
Character Set Select (Printable Symbols)		SFCC 6	ESC 6	6–23
Character Set Select (Printable Symbols)		N/A	ESC u	6–24
Character Set Select: ECMA–94 Latin 1 Extended		SFCC OSET	N/A	6–27
Character Set Select: International Languages		SFCC R SFCC PSET	ESC R	6–25
Download a Language		SFCC V	ESC V	6–31
Extended Character Set		SO SFCC SO SFCC n SFCC 4	ESC 4	6–38
Extended Character Set Cancel		SI SFCC SI SFCC o SFCC 5	ESC 5	6–39
Printer Reset		SFCC @	ESC @	6–56
Printer Select		N/A	DC1	6–60
Printer Deselect		N/A	DC3	6–61

Backspace

	ASCII	Hex	Decimal
P–Series/ Serial	BS	08	08

Purpose Moves the logical print head to the left one character space toward the first column.

Comment When configured for backspace (in P–Series printer protocol), BS moves the character position indicator (the logical print head position) one character space to the left at the current character pitch setting. The code is ignored if the logical print head is positioned at the first character column. When the backspace code is received, printing speed for the print line may be reduced to half.

Example Print and backspace two character positions.

```
10 LPRINT "TTTTT";
20 LPRINT CHR$(8);CHR$(8);
30 LPRINT "=="
```

```
TTT==
```

Bell

	ASCII	Hex	Decimal
P–Series/ Serial	BEL	07	07

Purpose Sounds a buzzer/beeper.

Comment The BEL function sounds a buzzer/beeper for 0.2 seconds upon receipt of this command.

Bit Image Mode, Single Density

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC K	1B 4B	27 75

Purpose Selects Single (Normal) Density Bit Image graphics.

Expression CHR$(27);"K";CHR$(n1);CHR$(n2);"DATA"

where n1 + 256 n2 define the number of data bytes to follow.
DATA = ASCII characters for the dot pattern bytes.

NOTE: The DATA can be expressed in a CHR$(DATA) format with the appropriate decimal values of the ASCII characters supplied, especially in cases where the dot patterns of non-printable characters are required.

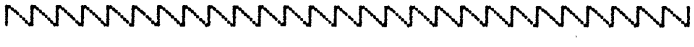
Comment For detailed information, refer to the Bit Image section in the Graphics chapter.

Example The following example produces a pattern of Single Density Bit Image graphics. The 9 data bit pattern is repeated 27 times. Compare this example to the double density and quadruple density examples.

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

```
10 WIDTH "lpt1:",255
20 LPRINT "Single Density Bit Image Graphics"
30 LPRINT CHR$(27);"K";CHR$(244);CHR$(0);
40 FOR N=1 TO 27
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Single Density Bit Image Graphics
```



Bit Image Mode, Double Density

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC L	1B 4C	27 76

Purpose Selects Double Density Bit Image graphics.

Expression CHR$(27);″L″;CHR$(n1);CHR$(n2);″DATA″

where n1 + 256 n2 define the number of data bytes to follow.
DATA = ASCII characters for the dot pattern bytes.

NOTE: The DATA can be expressed in a CHR$(DATA) format with the appropriate decimal values of the ASCII characters supplied, especially in cases where the dot patterns of non-printable characters are required.

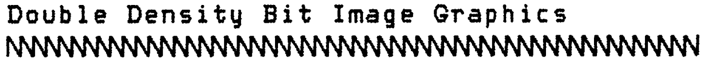
Comment Double Density printing may reduce print speed to half. For detailed information, refer to the Bit Image section in the Graphics chapter.

Example The following example produces Double Density Bit Image graphics of the pattern used in the Single Density Bit Image Mode example. Note that the amount of data must be doubled for double density (the data is used 54 times rather than 27).

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

```
10 WIDTH "lpt1:",255
20 LPRINT "Double Density Bit Image Graphics"
30 LPRINT CHR$(27);"L";CHR$(231);CHR$(1);
40 FOR N=1 TO 54
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Double Density Bit Image Graphics
```



Bit Image Mode, Double Density Double Speed

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC Y	1B 59	27 89

Purpose Prints graphics at twice the speed of Double Density (same speed as Single Density) by ignoring adjacent dots.

Expression CHR$(27);"Y";CHR$(n1);CHR$(n2);"DATA"

where n1 + 256 n2 define the number of data bytes to follow.
DATA = ASCII characters for the dot pattern bytes.

NOTE: The DATA can be expressed in a CHR$(DATA) format with the appropriate decimal values of the ASCII characters supplied, especially in cases where the dot patterns of non-printable characters are required.

Comment For detailed information, refer to the Bit Image section in the Graphics chapter.

Example The following example produces Double Density Double Speed Bit Image graphics of the pattern used in the Single Density Bit Image Mode example. Note that the amount of data must be doubled for double density (the data is used 54 times rather than 27).

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

```
10 WIDTH "lpt1:",255
20 LPRINT "Double Density Double Speed Bit Image Graphics"
30 LPRINT CHR$(27);"Y";CHR$(231);CHR$(1);
40 FOR N=1 TO 54
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Double Density Double Speed Bit Image Graphics
```

Bit Image Mode, Quadruple Density

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC Z	1B 5A	27 90

Purpose Selects Quadruple Density Bit Image graphics.

Expression CHR$(27);"Z";CHR$(n1);CHR$(n2);"DATA"

where n1 + 256 n2 define the number of data bytes to follow.
DATA = ASCII characters for the dot pattern bytes.

NOTE: The DATA can be expressed in a CHR$(DATA) format with the appropriate decimal values of the ASCII characters supplied, especially in cases where the dot patterns of non-printable characters are required.

Comment Quadruple Density printing may reduce print speed to half. For detailed information, refer to the Bit Image section in the Graphics chapter.

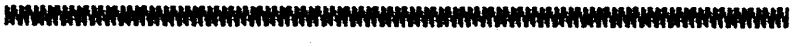
The printed density in this mode is 120 dpi horizontal and 72 dpi vertical when selected from the Data Processing print mode or 180 dpi horizontal and 96 dpi vertical when selected from the Correspondence print mode.

Example The following example produces quadruple density graphics of the pattern used in the Single Density Bit Image Mode example. Note that the amount of data must be quadrupled for quadruple density (the data is used 108 times rather than 27).

NOTE: Depending on the host computer system, it may be necessary to include a width statement within the BASIC program.

```
10 WIDTH "lpt1:",255
20 LPRINT "Quad Density Bit Image Graphics"
30 LPRINT CHR$(27);"Z";CHR$(205);CHR$(3);
40 FOR N=1 TO 108
50 RESTORE
60 FOR I=1 TO 9
70 READ R
80 LPRINT CHR$(R);
90 NEXT I
100 NEXT N
110 LPRINT CHR$(255)
120 DATA 255,128,64,32,16,8,4,2,1
```

```
Quad Density Bit Image Graphics
```



Bold Print

	ASCII	Hex	Decimal
P–Series	SFCC G SFCC j (1 line)	SFCC 47 SFCC 6A	SFCC 71 SFCC 106
Serial	ESC G	1B 47	27 71

Purpose Selects bold character printing.

Comment When the bold character printing control code is received, all characters are printed in bold until reset by the bold print reset control code or printer reset. Bold Print is the same as printing double strike. Bold character printing may reduce print speed to half.

SFCC j selects bold print for the current line only. When this code is received, all characters are printed in bold until reset by the bold print reset control code, printer reset, or a paper motion command.

Superscript or subscript characters implement the bold function with a vertical "shadow" rather than a double strike. The bold attribute has no affect on superscript or subscript characters themselves.

Example The following sample program illustrates bold character printing.

```
10 LPRINT "Control code ESC G"
20 LPRINT CHR$(27);"G";
30 LPRINT "selects bold character printing,"
40 LPRINT "for example: AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPp."
50 LPRINT "Control code ESC H"
60 LPRINT CHR$(27);"H";
70 LPRINT "cancels bold character printing."
```

```
Control code ESC G
selects bold character printing,
for example: AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPp.
Control code ESC H
cancels bold character printing.
```

Bold Print Reset

	ASCII	Hex	Decimal
P–Series	SFCC H	SFCC 48	SFCC 72
Serial	ESC H	1B 48	27 72

Purpose Resets bold character printing.

Comment The bold print reset control code only resets the bold print character attribute. Other print attributes such as double wide printing are not affected.

Example Refer to the Bold Print control code for a sample program of bold character print set and reset.

Cancel

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	CAN	18	24

Purpose Clears the print buffer of all printable symbols since the last paper motion command was received.

Comment This control code may be used as a “delete line” function. However, use it with extreme care to avoid possible misprinting. This control code cancels the double wide attribute set by SO (in Serial Matrix printer protocol) if active. No other print attributes are affected.

Carriage Return

	ASCII	Hex	Decimal
P–Series/ Serial	CR	0D	13

Purpose Returns the logical print head to the first character column (resets the pointer to the first character position).

Comment The CR code may or may not cause printing or paper motion, depending on the DEFINE CR CODE configuration parameter value. If the DEFINE CR CODE submenu displays:

DEFINE CR CODE
CR=CR

the characters following the CR are printed over the previous characters on the line. If identical characters are placed in the same position on the line, those characters will print in bold (double strike) print when the Overstrike Mode is enabled from the control panel.

The CR=CR configuration causes subsequent printable data to overprint previous data at half speed if Overstrike is enabled from the control panel (and prints somewhat faster if Overstrike is disabled), unless an intervening paper motion command is received. See the Overstrike/Overlay section on page 6–1.

If the DEFINE CR CODE submenu displays:

DEFINE CR CODE
CR=CR+LF

control code CR is converted to perform a carriage return and line feed function.

The CR code in Serial Matrix printer protocol cancels expanded (double wide) print when set by code SO and ESC SO (single line printing attribute).

Character Pitch 10 CPI

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC P	1B 50	27 80

Purpose Sets character pitch to 10 cpi.

Comment Control Code ESC X can also select a character pitch of 10 cpi. Refer to Print Mode/ Pitch Selection on page 6–57.

Character Pitch 12 CPI

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC M ESC :	1B 4D 1B 2A	27 77 27 42

Purpose Sets character pitch to 12 cpi.

Comment Control Code ESC X can also select a character pitch of 12 cpi. Refer to Print Mode/ Pitch Selection on page 6–57.

Character Set Select

	ASCII	Hex	Decimal
P–Series	SFCC l xyz (lowercase L)	SFCC 6C xyz	SFCC 108 xyz
Serial	ESC l xyz (lowercase L)	1B 6C xyz	27 108 xyz

Purpose Selects the character set, extended character set, and the international language for a specific character set.

Expression CHR$(27);"l";CHR$(x);CHR$(y);CHR$(z);

where **x** is the character set (Table 6–1);

y is the international language for the selected character set (Table 6–2);

z is the extended character set for the selected character set (Table 6–3);

Table 6–1. Character Set Select (x)

x	Character Set
0(30)	IBM PC
1(31)	Multinational
2(32)	ECMA–94 Latin 1
3(33)	DEC Multinational

Table 6–2. International Language Select (y)

	x 0(30)	1(31)	2(32)	3(33)
y	**IBM PC**	**Multinational**	**ECMA –94 Latin 1**	**DEC Multinational**
0(30)	ASCII (USA)	ASCII (USA)	ASCII (USA)	ASCII (USA)
1(31)	French	EBCDIC	German	French
2(32)	German		Swedish	German
3(33)	English		Danish	English
4(34)	Danish		Norwegian	Norwegian/Danish
5(35)	Swedish		Finnish	Swedish
6(36)	Italian		English	Italian
7(37)	Spanish		Dutch	Spanish
8(38)	Japanese		French	Japanese
9(39)	French Canadian		Spanish	French Canadian
10(3A)	Latin American		Italian	Dutch
11(3B)			Turkish	Finnish
12(3C)			Japanese	Swiss

Table 6–3. Extended Character Set Select (z)

z	x 0(30) IBM PC	1(31) Multinational	2(32) ECMA–94 Latin 1	3(33) DEC Multinational
0(30)	IBM PC Extended Set	Multinational Extended Set		DEC Multinational Extended Set
1(31)			Multinational DP 10 cpi	
2(32)			Multinational DP 12 cpi	
3(33)			Multinational NLQ 10 cpi	
4(34)				
5(35)				
6(36)				
7(37)				
8(38)				
9(39)				
10(3A)				
11(3B)				
12(3C)			Multinational (at Primary set mode and pitch)	

Comment

If the asterisk (*) is the value selected for **x**, the character set will not change. If * is the value selected for **y** or **z**, the previously selected international language and/or extended character set for the selected character set is used.

If X is the value selected for **y**, the primary language will access the downloaded character substitution table defined by SFCC V for the selected character set. SFCC V, Download a Language, is discussed on page 6–31.

The character set, international language and extended character set can also be selected from the printer control panel. The control code setting overrides the control panel selection. Except for the asterisk and X values discussed above, values other than those shown in the tables result in the control sequence being terminated.

Refer to Appendix B for individual character set charts.

Example The following example illustrates Character Set Select, where the character set is ECMA–94, the international language is Norwegian, and the extended character set is Multinational DP 10.

```
10 LPRINT "Control code ESC 1 2 4 2 selects"
20 LPRINT "the ECMA-94 character set with the"
30 LPRINT "Norwegian international language"
40 LPRINT "and the Multinational DP 12 extended character set."
50 LPRINT
60 LPRINT "A B C [ ] { } "; CHR$(176);" ";CHR$(177)
70 LPRINT CHR$(27);"1";CHR$(2);CHR$(4);CHR$(2);
80 LPRINT "A B C [ ] { } "; CHR$(176);" ";CHR$(177)
90 LPRINT CHR$(27);"1";CHR$(0);CHR$(0);CHR$(0);
```

```
Control code ESC 1 2 4 2 selects
the ECMA-94 character set with the
Norwegian international language
and the Multinational DP 12 extended character set.

A B C [ ] { } ▒ ▒
A B C Æ Å æ à ° ±
```

Character Set Select: 80–9F = Control Codes

	ASCII	Hex	Decimal
P–Series	SFCC 7	SFCC 37	SFCC 55
Serial	ESC 7	1B 37	27 55

Purpose: Selects the character set wherein hex codes 80 to 9F are control codes. Also includes hex codes 03 to 06 and 15 in Serial Matrix printer protocol. Cancels Character Set Select activated by SFCC 6 or ESC u.

Comment: This feature is also selectable from the control panel (Application Compatibility configuration menu structure).

Refer to the character set charts in Appendix B for the control codes in Serial Matrix and P–Series.

Character Set Select: 80–9F = Printable Symbols

	ASCII	Hex	Decimal
P–Series	SFCC 6	SFCC 36	SFCC 54
Serial	ESC 6	1B 36	27 54

Purpose: Selects the character set wherein hex codes 80 to 9F are printable symbols. Also includes hex codes 03 to 06 and 15 in Serial Matrix printer protocol. Cancels Character Set Select activated by ESC u.

Comment: This feature is also selectable from the control panel (Application Compatibility configuration menu structure).

Refer to the character set charts in Appendix B for the printable symbols in Serial Matrix and P–Series.

Character Set Select: 80–9F = Printable Symbols

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC u	1B 75	27 117

Purpose: Selects the character set wherein hex codes 80 to 9F are printable symbols. Hex codes 03 to 06 and 15 are control codes. Cancels Character Set Select activated by SFCC 6.

Comment: Refer to Appendix B for the printable symbols in Serial Matrix.

Character Set Select: International Languages

	ASCII	Hex	Decimal
P–Series	SFCC PSET;n SFCC R n	SFCC 52 n	SFCC 82 n
Serial	ESC R n	1B 52 n	27 82 n

Purpose Specifies the international language set identified by “n” in the basic character set selected from the control panel (ECMA–94 Latin 1, IBM PC, Multinational, and DEC Multinational).

where “n” corresponds to the language as shown in Table 6–4 below.

Table 6–4. International Character Sets

“n”		CHARACTER SET SELECTED:			
SFCC/ ESC R (hex)	**PSET**	**IBM PC**	**Multinational**	**ECMA–94 Latin 1**	**DEC Multinational**
0(30)	**0**	ASCII (USA)	ASCII (USA)	ASCII (USA)	ASCII (USA)
1(31)	**1**	French	EBCDIC	German	French
2(32)	**2**	German		Swedish	German
3(33)	**3**	English		Danish	English
4(34)	**4**	Danish		Norwegian	Norwegian/Danish
5(35)	**5**	Swedish		Finnish	Swedish
6(36)	**6**	Italian		English	Italian
7(37)	**7**	Spanish		Dutch	Spanish
8(38)	**8**	Japanese		French	Japanese
9(39)	**9**	French Canadian		Spanish	French Canadian
0A(3A)	**10**	Latin American		Italian	Dutch
0B(3B)	**11**			Turkish	Finnish
0C(3C)	**12**			Japanese	Swiss
0D(3D)	**13**	*(Currently undefined)*			
0E(3E)	**14**				
0F(3F)	**15**				
10(40)	**16**				
11(41)	**17**				
12(42)	**18**				
13(43)	**19**				
14(44)	**20**				
15(45)	**21**				

Comment The international character set can also be selected from the control panel. The control code setting overrides the control panel character set selection. Values other than those selectable from Table 6–4 are ignored, except for SFCC RX discussed below. In PSET mode, values outside the range on Table 6–4 produce an error message (Command Line Error Messages are listed on page 6–3). Refer to the individual character set charts in Appendix B.

Selecting SFCC RX accesses the character substitution table defined by SFCC V for the current base character set. Refer to SFCC V, Download a Language, on page 6–31.

Example The following example illustrates international character selection using the IBM PC character set.

```
10 LPRINT "Control code ESC R 5 selects"
20 LPRINT "the Swedish character set shown beneath"
30 LPRINT "the USA (ASCII) characters."
40 LPRINT
50 LPRINT "A B C D [ \ ] ^ _ ` { | } ~"
60 LPRINT CHR$(27);"R";CHR$(5);
70 LPRINT "A B C D [ \ ] ^ _ ` { | } ~"
80 LPRINT CHR$(27);"R";CHR$(0);
```

```
Control code ESC R 5 selects
the Swedish character set shown beneath
the USA (ASCII) characters.

A B C D [ \ ] ^ _ ` { | } ~
A B C D Ä ö Å ü _ é ä ö å ü
```

Character Set Select: ECMA–94 Latin 1 Extended

	ASCII	Hex	Decimal
P–Series	SFCC OSET;n		
Serial	N/A	N/A	N/A

Purpose Selects the Extended Character Set and the print mode and pitch at which the extended character will print. This command is valid only in the ECMA–94 Latin 1 Extended Character Set; otherwise, this command is ignored.

Comment The value **n** can be 1, 2, 3, or 12 to select the print mode/pitch combinations available from Table 6–5. All other values result in an error message. In OSET mode, values outside the range in Table 6–5 produce an error message (Command Line Error Messages are listed on page 6–3).

OSET is valid *only* when the ECMA–94 Latin 1 character set is selected from the control panel. OSET is ignored if the IBM PC, Multinational, or DEC Multinational Character Sets are active.

Extended characters print at the print mode and pitch selected by the OSET command, even if that mode and pitch differs from the currently selected print mode and pitch. If the print mode differs between the extended and primary characters, the first character in the data stream selects the print mode at which that line will print. Different pitches can be printed on the same line.

Table 6–5. Print Modes/Pitches Available Using P–Series OSET (ECMA–94 Latin 1, Extended Character Set Only)

n	Print Mode/Pitch Select
1	Multinational DP 10 cpi
2	Multinational DP 12 cpi
3	Multinational NLQ 10 cpi
12	Multinational at Primary Character Set Mode and Pitch

Condensed Print

	ASCII	Hex	Decimal
P–Series	See Comment.		
Serial	SI	0F	15
	ESC SI	1B 0F	27 15

Purpose Selects 17 characters per inch (cpi) condensed print format.

Comment Condensed print can be selected using P–Series control code SFCC X or by Serial Matrix control code ESC X. Refer to Print Mode/Pitch Selection on page 6–57.

If 17 cpi is not supported by the currently selected print mode, the SI code is ignored.

The Serial Matrix condensed print control code SI affects all subsequent characters. After receiving code SI, all characters are printed in condensed print until reset by ESC M, ESC P, the condensed print reset control code DC2, printer reset, or a new print mode control code. The Serial Matrix SI code (hex 0F) is equivalent to the ESC SI code. If condensed print is not allowed in the current print mode, the code is ignored.

Example The following sample program illustrates condensed character printing and reset.

```
10 LPRINT "Control code"
20 LPRINT "SI selects"
30 LPRINT CHR$(15);
40 LPRINT "condensed character printing."
50 LPRINT "Control code DC2"
60 LPRINT CHR$(18);
70 LPRINT "resets condensed character printing."
```

```
Control code
SI selects
condensed character printing.
Control code DC2
resets condensed character printing.
```

Condensed Print Reset

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	DC2	12	18

Purpose Resets condensed character printing to 10 cpi.

Comment The condensed print reset control code selects 10 cpi character pitch. Other print attributes are not affected.

Other control code sequences which cancel condensed print are ESC M, ESC P, ESC @, or a new print mode control code.

Example See the Condensed Print control code example for an example of Condensed Print Reset.

Delete

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	DEL	7F	127

Purpose Deletes the previously received character on a line.

Comment Characters that have been truncated due to line length restrictions are not affected by this code.

Download a Language

	ASCII	Hex	Decimal
P–Series	SFCC V	SFCC 56	SFCC 86
Serial	ESC V	1B 56	27 86

Purpose Allows you to define and download a character substitution table and place it within the 224 printable symbol code points.

Expression SFCC V is followed by ASCII characters:

{QQQ}E{AAA}E{SSSSS}E

NOTE: Each parameter is visually separated by paired brace symbols for clarity in distinguishing parameters. Do not input these brace pairs in the command sequence.

where **E** is the terminator following each numeric field.

{QQQ} represents the decimal value between 0 and 255 identifying the number of entries in the substitution table. No leading zeros are required for one– and two–digit entries. Each entry consists of:

{AAA}, representing the decimal value between 0 and 255 identifying the address code that will cause the substituted character to print. No leading zeros are required for one– and two–digit entries.

{SSSSS}, representing the decimal value between 0 and 65535 identifying the symbol point in the *Printronix* standard Character Library (page 9–4). No leading zeros are required for less than five–digit entries.

Comment The character substitution table is valid only for the current base character set. You cannot access the character substitution table from within another character set or after changes have been made to the current character set. You can substitute any symbol within the Character Library (page 9–4) into any printable symbol code point.

If {AAA} is the same value as a control character, the control character takes precedence, and printing of that value does not occur. If the Space (20 hex) is substituted, unexpected results may occur, including decreased print speed.

Once defined and downloaded by this control code, you can save the table created by this control code into printer power–up configuration and selected from the host interface or the control panel. When selected from the host, Download a Language is accessed using SFCC RX (Character Set Select: International Languages). When selected via control panel, the message display reads “DOWNLOADED,” and a configuration printout reads DOWNLOADED in the international language section of the printout.

Download a Language (continued)

Example The following sample program illustrates Downloading a Language.

```
10 LPRINT "Control code ESC V 2E65E224E66E225E"
20 LPRINT "Downloads a language that replaces"
30 LPRINT "A with Alpha and B with Beta."
40 LPRINT "Control code ESC RX activates the"
50 LPRINT "Downloaded language."
60 LPRINT CHR$(27);"V2E65E224E66E225E"
70 LPRINT "AB"
80 LPRINT CHR$(27);"RX";
90 LPRINT "AB"
```

```
Control code ESC V 2E65E224E66E225E
Downloads a language that replaces
A with Alpha and B with Beta.
Control code ESC RX activates the
Downloaded language.

AB
αβ
```

where: **ESC V {2}E{65}E{224}E{66}E{225}E**

ESC V is the Serial Matrix Control Code Header introducing the Download a Language command.

{**2**} is the quantity of entries (characters) in the substitution table (in this example, the letters A and B).

{**E**} is the numeric field terminator (required after *each* numeric field).

{**65**} is the (decimal) address code for the first character in the current character set that causes the substituted character to print (Uppercase A/Alpha).

{**224**} is the (decimal) symbol point in the Character Library (page 9–4) representing the substituted character selected (Lowercase Alpha).

{**66**} is the (decimal) address code for the second character in the current character set that causes the substituted character to print (Uppercase B/Beta).

{**225**} is the (decimal) symbol point in the Character Library representing the substituted character selected (Lowercase Beta).

Elongated (Double High) Print (1 Line)

	ASCII	Hex	Decimal
P–Series	SFCC h BS	SFCC 68 08	SFCC 104 08
Serial	ESC h	1B 68	27 104

NOTE: SFCC h replaces SFCC d used in some previous Printronix firmware versions.

Purpose Selects elongated (double high) character printing for one line only. Elongated characters are approximately double height but standard width.

Comment The elongated character control code is a line–by–line print attribute; when the control code is received, one entire line of elongated characters is printed and then automatically reset.

In P–Series protocol, elongated characters are formed by printing twice the number of dot rows except for the top and bottom rows. In Serial Matrix protocol, elongated characters are formed by printing twice the number of dot rows, *including* the top and bottom rows.

When configured for double high print, P–Series control code BS (Hex 08) also selects elongated character printing for a single line.

When using this feature with relative line slewing, the paper moves **n** + 1 lines rather than **n** lines. Refer to the Vertical Format Units chapter for more information on relative line slewing. When using small line spacing and the lines overlap, an unexpected print format may result.

Example The following sample program illustrates elongated character printing.

```
10 LPRINT "Control code"
20 LPRINT "ESC h selects"
30 LPRINT CHR$(27);"h";
40 LPRINT "elongated character printing"
50 LPRINT "for one line only."
```

```
Control code
ESC h selects
elongated character printing
for one line only.
```

Emphasized Print

	ASCII	Hex	Decimal
P–Series	SFCC E	SFCC 45	SFCC 69
Serial	ESC E	1B 45	27 69

Purpose Selects emphasized character print format.

Comment When the emphasized print control code is received, all characters are printed in emphasized print until reset by the emphasized print reset control code or printer reset. The emphasized print attribute is implemented by horizontal “shadow” printing and may reduce the print speed to half.

Emphasized print is ignored during superscript or subscript printing, and when 15 or 17 cpi characters have been selected.

Example The following sample program illustrates emphasized character printing.

```
10 LPRINT "Control code"
20 LPRINT "ESC E selects"
30 LPRINT CHR$(27);"E";
40 LPRINT "emphasized character printing."
42 LPRINT "Control code ESC F"
50 LPRINT CHR$(27);"F";
60 LPRINT "cancels emphasized character printing."
```

```
Control code
ESC E selects
emphasized character printing.
Control code ESC F
cancels emphasized character printing.
```

Emphasized Print Reset

	ASCII	Hex	Decimal
P–Series	SFCC F	SFCC 46	SFCC 70
Serial	ESC F	1B 46	27 70

Purpose Resets emphasized character printing.

Comment The emphasized print reset control code only resets the emphasized print character attribute.

Example See the Emphasized Print control code example for an example of Emphasized Print Reset.

Expanded (Double Wide) Print

	ASCII	Hex	Decimal
P–Series	SFCC W n	SFCC 57 n	SFCC 87 n
Serial	ESC W n	1B 57 n	27 87 n

Purpose Selects or resets expanded (double wide) print.

where n = 1 selects expanded print (hex 01 or hex 31)
n = 0 resets expanded print (hex 00 or hex 30)

Comment When expanded print using SFCC W is received, all characters are printed double wide until reset by the expanded print reset control code, printer reset (or DC4 when in Serial Matrix printer protocol).

Also refer to Serial Matrix control code SO and ESC SO, Expanded (Double Wide) Print for one line only.

Example The following sample program illustrates expanded character printing and expanded character printing reset.

```
10 LPRINT "Control code"
20 LPRINT "ESC W 1 selects"
30 LPRINT CHR$(27);"W";CHR$(1);
40 LPRINT "expanded character printing."
50 LPRINT "Control code"
60 LPRINT "ESC W 0 resets"
70 LPRINT CHR$(27);"W";CHR$(0);
80 LPRINT "expanded character printing."
```

```
Control code
ESC W 1 selects
e x p a n d e d   c h a r a c t e r   p r i n t i n g .
C o n t r o l   c o d e
E S C   W   0   r e s e t s
expanded character printing.
```

Expanded (Double Wide) Print (One Line Only)

	ASCII	Hex	Decimal
P–Series	SFCC k	SFCC 6B	SFCC 107
Serial	SO ESC SO	0E 1B 0E	14 27 14

Purpose Selects expanded (double wide) print for one line only.

Comment This expanded print control code is a line–by–line print attribute; when the SO, ESC SO, or SFCC k control code is received, the current line is printed double wide and automatically reset.

Reset this control code by a paper motion control code (LF, VT, CR, etc.), by the DC4 (double wide cancel) code, ESC @ (printer reset), CAN or ESC W (double wide print). When set by SO, double wide print is not cancelled by the Auto Line Feed configuration.

Example The following sample program illustrates Expanded Print for one line only. Another example of expanded printing is shown for Expanded (Double Wide) Print, ESC W, SFCC W on page 6–36.

```
10 LPRINT "Control code"
20 LPRINT "SO selects"
30 LPRINT CHR$(14);
40 LPRINT "expanded character printing"
50 LPRINT "for one line only."
```

```
Control code
SO selects
e x p a n d e d   c h a r a c t e r   p r i n t i n g
for one line only.
```

Extended Character Set

	ASCII	Hex	Decimal
P–Series	SO (Shift Out)	0E	14
	SFCC SO	SFCC 0E	SFCC 14
	SFCC n	SFCC 6E	SFCC 110
	SFCC 4	SFCC 34	SFCC 52
Serial	ESC 4	1B 34	27 52

Purpose Accesses the extended character set in the range A0 to FF hex using codes 20 to 7F hex.

Comment Used in 7–bit systems as if data bit 8 was set to 1. For example, sending code 20 hex accesses the symbol at code point A0 hex. If a printable symbol is not available at the code point, a space is printed.

SFCC 4 is not cancelled by the next paper motion command; all other commands are cancelled by paper motion.

Refer to the character set charts in Appendix B.

Extended Character Set Cancel (Primary Character Set Select)

	ASCII	Hex	Decimal
P–Series	SI (Shift In) SFCC SI SFCC o SFCC 5	0F SFCC 0F SFCC 6F SFCC 35	15 SFCC 15 SFCC 111 SFCC 53
Serial	ESC 5	1B 35	27 35

Purpose Cancels Alternate Character Set as selected by SO, SFCC SO, SFCC n, SFCC 4 and ESC 4, and selects the Primary Character Set.

Comment Used in 7–bit systems. If data bit 8 is disabled, this control code selects the range as if data bit 8 is set to 0, and data is printed as characters from 20 to 7F hex.

Form Feed

	ASCII	Hex	Decimal
P–Series/ Serial	FF	0C	12

Purpose Prints the data in the buffer, advances the paper to the next top–of–form, and moves the printhead to the first character column.

Comment The default forms length is determined by the configuration in nonvolatile memory. Forms length is set by using the control panel F/L switch or forms length control codes. Code FF cancels all single–line only print attributes.

The Form Feed command reacts differently in the P–Series and Serial Matrix emulation modes when the VFU is active. Refer to the Vertical Format Units chapter.

Forms Length Set (Inches)

	ASCII	Hex	Decimal
P–Series	SFCC INCHES;n.f		
Serial	ESC C NUL n	1B 43 0 n	27 67 0 n

Purpose Sets the length of forms (paper) in inches.

where n = whole numbers from 1 to 24 to specify the number of inches on a page.

f = fractional number in .5–inch increments (minimum forms length is .5 inches).

Comment Upon receipt of this code, the current line becomes the first line of the form, and the forms length set becomes the current forms length. Vertical tab positions are cleared. Forms length is defined in inches; therefore, subsequent line spacing changes do not affect the result of this command.

The maximum forms length is 24 inches. All other values are ignored. In INCHES mode, incorrect values produce an error message (Command Line Error Messages are listed on page 6–3).

When forms length is set by the ESC C sequence, the skip–over perforation is set to zero.

Forms length can also be set using the F/L switch on the control panel. The control code forms length setting from the host computer overrides the control panel setting and is reflected on the display when F/L is pressed.

In P–Series protocol, if the VFU is enabled and loaded, this command is ignored.

In P–Series protocol, you can specify .5–inch increments. For example, in P–Series protocol, sending the command **SFCC INCHES;7.5** results in a form length setting of 7–1/2 inches. In Serial Matrix printer protocol, you can specify whole numbers only; thus, sending the command **ESC C NUL 7** results in a form length of 7 inches.

Forms Length Set (Lines)

	ASCII	Hex	Decimal
P–Series	SFCC LINES;n		
Serial	ESC C n	1B 43 n	27 67 n

Purpose Sets the length of a form (paper) in lines.

where n = 1 to 192 (P–Series) or 1 to 127 (Serial) to specify the number of lines per page at the current line spacing.

Comment The forms length set becomes the current forms length. Forms length is defined in inches; therefore, subsequent line spacing changes do not affect the result of this command.

The forms length is set to the number of lines defined by the quotient of “n” and the current line spacing so that the units are in inches. In LINES mode, values of **n** in excess of 192 causes an error message (Command Line Error Messages are listed on page 6–3).

If the calculated forms length in lines is not an exact multiple of the paper step distance, the forms length value adjusts down to the next possible multiple.

When forms length is set by the ESC C sequence, the skip–over perforation is set to zero.

In P–Series protocol, if the VFU is enabled and loaded, this command is ignored.

Horizontal Tab

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	HT	09	09

Purpose Moves the logical printhead right to the next horizontal tab stop.

Comment Power–on default horizontal tabs are set at every eighth character in the Serial Matrix printer protocol. If there are no horizontal tabs set or the logical printhead is located at the last character column, the code is ignored and no movement occurs.

Horizontal tabs are stored as a relative position; therefore, character pitch changes change horizontal tab positions. Refer to the Horizontal Tab Set control code to set new tab positions.

Horizontal Tab Set

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC D n	1B 44 n	27 68 n

Purpose Sets up to 32 horizontal tab positions.

Expression CHR$(27);"D";CHR$(n1);...CHR$(n32);CHR$(0);

where n1 through n32 specify the character column of the tab positions. CHR$(0) is the sequence terminator.

Comment You can set up to 32 different tab positions. The values must be listed in ascending order or they are ignored. The physical tab position is the product of "n" and the current cell width (1/pitch), excluding double wide. Tabs in excess of 32 or those positioned beyond 13.2 inches are also ignored.

Clear the tab positions by sending the CHR$(27);"D";CHR$(0) sequence. Powering the printer on/off initializes the tabs to every eighth character column. Horizontal tabs are accessed by control code HT.

Example The following example illustrates horizontal tab setting and accessing.

```
10 LPRINT "Control code"
20 LPRINT "ESC D CHR$(4);CHR$(10);CHR$(0)"
30 LPRINT "sets tab stops at columns 4 and 10."
40 LPRINT "Control code HT"
50 LPRINT "accesses the tab stops as follows:"
60 LPRINT CHR$(27);"D";CHR$(4);CHR$(10);CHR$(0);
70 LPRINT CHR$(9);
80 LPRINT "column 4"
90 LPRINT CHR$(9);CHR$(9);
100 LPRINT "column 10"
```

```
Control code
ESC D CHR$(4);CHR$(10);CHR$(0)
sets tab stops at columns 4 and 10.
Control code HT
accesses the tab stops as follows:
    column 4
           column 10
```

Line Feed

	ASCII	Hex	Decimal
P–Series/ Serial	LF	0A	10

Purpose

Prints the data in the buffer (if any) and advances the paper one line at the current line space setting.

Comment

If configured for LF equals newline (LF=CR+LF), the logical print head is positioned at character column 1 of the new line. Otherwise, the logical print head does not move when configured for LF function only (LF=LF ONLY). The LF function cancels all single line print attributes such as double high (elongated) and double wide (expanded) characters.

This code is always configured for LF=CR+LF in the P–Series protocol.

In the P–Series Even Dot Plot mode (high density graphics), the LF code does not cause paper motion; the data in the buffer is plotted and the logical print head is positioned at character column 1 in anticipation of the Odd Dot Plot control code to complete high density graphic plotting.

In the P–Series Odd Dot Plot mode (normal density graphics), the LF code plots the data in the buffer, advances the paper a single dot row at the current vertical dot density, and positions the logical print head at character column 1.

Line Feed n/216 Inch (One Line Only)

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC J n	1B 4A n	27 74 n

Purpose Advances paper n/216 inch for one line only.

where n = 1 to 255

Comment The n/216–inch line feed control code is effective for one line only. All single–line–only print attributes are canceled.

If the printer is configured for LF equals newline (LF=CR+LF), the paper advances one line at the current line space setting and the logical print head is positioned at character column 1. When configured for LF function only (LF=LF ONLY), the logical print head remains at the current character column position.

The paper moves only in multiples of the current dot row spacing. If the distance to move is other than a multiple of the current dot row spacing, the remainder is added to the next paper motion command.

Small values of **n** may result in overlapping lines. Overlapping lines may also occur if print attributes such as Elongated (Double High), Superscript, or Subscript characters are used on the same line. Printing at different horizontal and vertical densities does not cause overlapping.

Example The following example illustrates n/216–inch line spacing.

```
10 LPRINT "Control code ESC J 200
20 LPRINT CHR$(27);"J";CHR$(200);
30 LPRINT "performs a 200/216 inch"
40 LPRINT "line feed function for one line only."
```

```
Control code ESC J 200
```

```
performs a 200/216 inch
line feed function for one line only.
```

Line Spacing 1/6 Inch

	ASCII	Hex	Decimal
P–Series	SFCC LPI;n SFCC 2	SFCC 32	SFCC 50
Serial	ESC 2	1B 32	27 50

Purpose Sets line spacing to 6 lpi or as set by ESC A.

Comment The value of **n** can only be 6 or 8. In P–Series protocol and LPI mode, if **n** = 6, this command sets line spacing to 1/6 inch. Values of **n** other than 6 or 8 cause an error message (Command Line Error Messages are listed on page 6–3).

SFCC/ESC 2 asserts n/72–inch line spacing as set by SFCC/ESC A (page 6–51). If no distance has been set by SFCC/ESC A, the distance is 1/6 inch.

The control code line spacing selection overrides the control panel line spacing setting.

Example The following example illustrates 1/6–inch line spacing and assumes that a distance has not been set by ESC A.

```
10 LPRINT "Control code ESC 2 sets"
20 LPRINT CHR$(27);"2";
30 LPRINT "line spacing at"
40 LPRINT "6 lpi for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 2 sets
line spacing at
6 lpi for all subsequent lines
until reset or another spacing is selected.
```

Line Spacing 1/8 Inch (8 lpi)

	ASCII	Hex	Decimal
P–Series	SFCC LPI;n SFCC 0	SFCC 30	SFCC 48
Serial	ESC 0	1B 30	27 48

Purpose Specifies continuous line spacing at 1/8–inch increments (8 lpi).

Comment When the 1/8–inch line spacing control code is received, all lines are printed at 8 lpi until a new line spacing is selected or the power is reset. The control code line spacing selection overrides the control panel line spacing setting and 8 lpi is reflected on the display when the 6/8 LPI switch is pressed.

The value of **n** can only be 6 or 8. When using SFCC LPI;n in the P–Series mode and **n** = 8, this command sets line spacing to 1/8 inch. Values of **n** other than 6 or 8 cause an error message (Command Line Error Messages are listed on page 6–3).

Example The following example illustrates 1/8–inch line spacing.

```
10 LPRINT "Control code ESC 0 sets"
20 LPRINT CHR$(27);"0";
30 LPRINT "line spacing at"
40 LPRINT "1/8 (8 lpi) inch for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 0 sets
line spacing at
1/8 (8 lpi) inch for all subsequent lines
until reset or another spacing is selected.
```

Line Spacing 8 or 10.3 lpi (One Line Only)

	ASCII	Hex	Decimal
P–Series	ACK SFCC f	06 SFCC 66	06 SFCC 102
Serial	N/A	N/A	N/A

Purpose Selects line spacing of 1/8 or 7/72 inch for the current line only.

Comment The default line spacing is reselected automatically after one line. Select line spacing either by the control panel 6/8 LPI switch or by line spacing control codes. The control code setting overrides the setting on the display.

8 and 10.3 lpi spacing for one line applies only to P–Series programming compatibility.

If the alternate line spacing selected from the control panel is 8 lpi, the ACK control code will set the line spacing to 8 lpi. If 10.3 lpi was selected from the control panel, the ACK control code will set line spacing to 10.3 lpi (7/72 inch).

In Serial Matrix printer protocol, you can use this line spacing command for a single line with ESC J (Line Feed n/216–Inch), where n=27 for 8 lpi, or n= 21 for 10.3 lpi, and Line Feed = Newline.

In Serial Matrix compatible control code ESC 0 and P–Series SFCC 0 can be used for continuous 1/8–inch line spacing.

Example The following example illustrates printing a single line of text at 8 lpi.

```
10 LPRINT "Control code ACK"
20 LPRINT "selects 8 lpi line spacing"
30 LPRINT CHR$(6);"for one line only."
40 LPRINT "The default line spacing is"
50 LPRINT "then reselected automatically."
```

```
Control code ACK
selects 8 lpi line spacing
for one line only.
The default line spacing is
then reselected automatically.
```

Line Spacing 7/72 Inch

	ASCII	Hex	Decimal
P–Series	SFCC 1	SFCC 31	SFCC 49
Serial	ESC 1	1B 31	27 49

Purpose Specifies the line spacing at 7/72–inch increments.

Comment When the 7/72–inch line spacing control code is received, all lines are printed at the 7/72–inch line spacing until a new line spacing is selected or the power is reset. The control code line spacing selection overrides the control panel line spacing setting, and the message display reflects the line spacing as 10.3 lines per inch.

Use caution when combining this control code with other print attributes such as Elongated (Double High), Superscript, or Subscript; overlapping lines may occur. Printing at different horizontal and vertical densities does not cause overlapping.

Example The following example illustrates 7/72–inch line spacing.

```
10 LPRINT "Control code ESC 1 sets"
20 LPRINT CHR$(27);"1";
30 LPRINT "line spacing at"
40 LPRINT "7/72 inch for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 1 sets
line spacing at
7/72 inch for all subsequent lines
until reset or another spacing is selected.
```

Line Spacing n/72 Inch

	ASCII	Hex	Decimal
P–Series	SFCC A n	SFCC 41 n	SFCC 65 n
Serial	ESC A n	1B 41 n	27 65 n

Purpose Stores a line spacing of n/72–inch increments.

where n = 1 to 85 (all others are ignored)

Comment When the ESC A control sequence is received, all line feed commands following an ESC 2 sequence* are at n/72–inch line spacing until a new line spacing is selected or the power is reset. The control code line spacing selection overrides the control panel line spacing setting and the message display reflects the line spacing in lines per inch. For the 20/72–inch example below, the message display would reflect 3.6 lpi spacing.

*The SFCC/ESC 2 sequence (page 6–47) asserts the line spacing which was stored by the preceding SFCC/ESC A sequence.

Small values of **n** may result in overlapping lines. Overlapping lines may also occur if print attributes such as Elongated (Double High), Superscript, or Subscript characters are used on the same line. Printing at different horizontal and vertical densities does not cause overlapping.

Example The following example illustrates 20/72–inch line spacing.

```
10 LPRINT "Control code ESC A 20 sets"
20 LPRINT CHR$(27);"A";CHR$(20);CHR$(27);"2";
30 LPRINT "line spacing at 20/72 inch"
40 LPRINT "increments for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC A 20 sets
line spacing at 20/72 inch

increments for all subsequent lines

until reset or another spacing is selected.
```

Line Spacing n/216 Inch

	ASCII	Hex	Decimal
P–Series	SFCC 3 n	SFCC 33 n	SFCC 51 n
Serial	ESC 3 n	1B 33 n	27 51 n

Purpose Specifies the line spacing at n/216–inch increments.

where n = 1 to 255

Comment When the n/216–inch line spacing control code is received, all line feeds following are at n/216–inch line spacing until a new line spacing is selected or the power is reset. The control code line spacing selection overrides the control panel line spacing setting and the message display reflects the line spacing in lines per inch. For a 50/216–inch line spacing, the message display would reflect 4.3 lpi spacing.

The paper moves only in multiples of the current dot row spacing. If the distance to move is other than a multiple of the current dot row spacing, the remainder is added to the next paper motion command.

Use caution when combining this control code with other print attributes such as Elongated (Double High), Superscript, or Subscript; overlapping lines may occur. Printing at different horizontal and vertical densities does not cause overlapping.

Example The following example illustrates n/216–inch line spacing.

```
10 LPRINT "Control code ESC 3 50 sets"
20 LPRINT CHR$(27);"3";CHR$(50);
30 LPRINT "line spacing at 50/216 inch"
40 LPRINT "increments for all subsequent lines"
50 LPRINT "until reset or another spacing is selected."
```

```
Control code ESC 3 50 sets
line spacing at 50/216 inch
increments for all subsequent lines
until reset or another spacing is selected.
```

Overscoring

	ASCII	Hex	Decimal
P–Series	SFCC _ n	SFCC 5F n	SFCC 95 n
Serial	ESC _ n	1B 5F n	27 95 n

Purpose Enables or disables automatic overscoring of all characters.

where n = 0 to disable automatic overscoring (hex 00 or hex 30)
n = 1 to enable automatic overscoring (hex 01 or hex 31)

Comment When automatic overscore is enabled, all characters, including spaces, are overscored until overscoring is disabled.

Example The following sample program illustrates automatic overscoring and overscoring reset.

```
10 LPRINT "Control code ESC _ 1"
20 LPRINT CHR$(27);"_";CHR$(1);
30 LPRINT "enables automatic overscoring."
40 LPRINT "Control code ESC _ 0"
50 LPRINT CHR$(27);"_";CHR$(0);
60 LPRINT "disables automatic overscoring."
```

```
Control code ESC _ 1
enables automatic overscoring.
Control code ESC _ 0
disables automatic overscoring.
```

Plot, Even Dot (P–Series High Density Graphics)

	ASCII	Hex	Decimal
P–Series	EOT SFCC d	04 SFCC 64	04 SFCC 100
Serial	N/A	N/A	N/A

Purpose Prints dots at the even numbered dot columns.

Comment The even dot plot code is used for programming high density graphics and must be used in conjunction with the Odd Dot Plot code (05 hex). Refer to the P–Series Compatible Plot Mode section in the Graphics chapter for detailed plot mode information.

Example Print two high density plot boxes using odd and even dot plot for high density graphics. Compare the example below to the normal density odd dot plot example on page 6–55.

```
10 LPRINT "EVEN AND ODD DOT PLOT" : LPRINT
20 LPRINT CHR$(4);"??????@@@@@@??????"
30 LPRINT CHR$(5);"??????@@@@@@??????"
40 FOR I=1 TO 36
50 LPRINT CHR$(4);"A@@@@ @@@@@@A@@@@ "
60 LPRINT CHR$(5);"A@@@@ @@@@@@A@@@@ "
70 NEXT I
80 LPRINT CHR$(4);"??????@@@@@@??????"
90 LPRINT CHR$(5);"??????@@@@@@??????"
```

```
EVEN AND ODD DOT PLOT
```

Plot, Odd Dot (P–Series Normal Density Graphics)

	ASCII	Hex	Decimal
P–Series	ENQ SFCC e	05 SFCC 65	05 SFCC 101
Serial	N/A	N/A	N/A

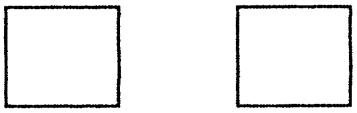
Purpose Prints dots at the odd numbered dot columns.

Comment This is the P–Series programming normal density graphics control code. The ENQ code should occur before any printable data in the data stream. For high density graphics, the Even Dot Plot code (04 hex) must be used in conjunction with (and precede) the Odd Dot Plot code. Refer to the P–Series Compatible Plot Mode section in the Graphics chapter for detailed plot mode information.

Example Print two normal density plot boxes using odd dot plot. Compare the odd dot plot example below to the high density Even Dot Plot example on page 6–54.

```
10 LPRINT "ODD DOT PLOT" : LPRINT
20 LPRINT CHR$(5);"??????@@@@@@??????"
30 FOR I=1 TO 36
40 LPRINT CHR$(5);"A@@@@ @@@@@@A@@@@ "
50 NEXT I
60 LPRINT CHR$(5);"??????@@@@@@??????"
```

```
ODD DOT PLOT
```



Printer Reset

	ASCII	Hex	Decimal
P–Series	SFCC @	SFCC 40	SFCC 64
Serial	ESC @	1B 40	27 64

Purpose Initializes all print mode related parameters to values previously saved.

Comment When reset to the previously saved values, the current line is set to the top–of–form position. Print mode, line spacing, international language selection, form length, skip–over perforation, and character pitch are reset to previously saved values. (In the Serial Matrix protocol, this command sets horizontal tabs at every eighth character column.) Character–by–character and line–by–line attributes are canceled. The vertical format unit is cleared. Interface parameters and emulation mode (P–Series or Serial Matrix) are not affected.

Print Mode/Pitch Selection

	ASCII	Hex	Decimal
P–Series	SFCC PMODE;n SFCC X mn	SFCC 58 mn	SFCC 88 mn
Serial	ESC X mn	1B 58 mn	27 88 mn

Purpose Selects the print mode (Data Processing, Correspondence, High Speed, or OCR) and character pitch in characters per inch (cpi).

where **In SFCC PMODE;n**
n ranges from 0 to 6 to select the print mode/pitch combinations available from Table 6–6. All other values result in an error message (Command Line Error Messages are listed on page 6–3).

where **In SFCC X mn** and **ESC X mn**
m = Print Mode code n = Pitch (cpi)

You can substitute an asterisk (*) (hex 2A) for **m** or **n**. Whenever the asterisk replaces **m** or **n**, then its current value does not change. Values other than those shown in Table 6–7 are ignored.

NOTE: While the value X used in earlier Printronix firmware versions remains valid for **m** *or* **n**, *it is recommended that the asterisk replace X.*

Comment P–Series PMODE switches to the Primary Character Set and selects print mode and pitch.

A complete table identifying print rates, pitch, and dot densities for all print modes is located in Appendix B.

You can also select print mode and pitch from the control panel. When the MODE switch is pressed, the print mode/pitch select control code from the host computer overrides the control panel print mode setting, and the print mode and pitch selection is reflected on the message display.

Table 6–6. Print Modes/Pitches Available Using P–Series PMODE

n	Print Mode & Pitch
0	Data Processing 10 cpi
1	Data Processing 12 cpi
2	Data Processing 15 cpi
3	Correspondence (NLQ) 10 cpi
4	High Speed (HS) 10 cpi
5	OCR–A 10 cpi
6	OCR–B 10 cpi

Table 6–7. Character Pitches Available by Print Mode

NOTE: The hex values shown (i.e., 0 and 30) are evuivalent. Either value can be used in your program expression.

m (hex):	0(30)	1(31)	2(32)	5(35)	6(36)	7(37)	8(38)
Print Mode:	Data Processing (DP)	Correspondence (NLQ)	High Speed (HS)	OCR–A	OCR–B	Barcode 145	Barcode 160
n (hex):	**Characters per inch:**						
0(30)	10	10	10	10	10	–	–
1(31)	12	12	12	–	–	12.1	–
2(32)	13.3	–	13.3	–	–	–	13.3
3(33)	15	15	15	–	–	–	–
4(34)	17.1	–	17.1	–	–	–	–

NOTE: The print mode (m) must be changed before the first printable symbol of a print line (spaces included) or the command sequence is deferred until the next line.

NOTE: When using the Multinational character set in OCR–A or OCR–B print mode, a unique character set is used. Refer to the Multinational Character Sets chapter for more information.

Example Any of the BASIC expressions listed below select the Data Processing print mode at 17.1 cpi.

where m (print mode = 0 or 30 for Data Processing; and
n (pitch) = 4 or 34 for 17.1 cpi.

```
CHR$(1);“X”;CHR$(0);CHR$(4);

CHR$(1);“X”;CHR$(30);CHR$(34);

CHR$(1);“X04”;
```

Print Mode/Pitch Selection (MVP)

	ASCII	Hex	Decimal
P–Series	SFCC [nq	SFCC 5B nq	SFCC 91 nq
Serial	ESC [nq	1B 5B nq	27 91 nq

Purpose: Selects the print mode (Data Processing, Correspondence, or High Speed) and selected character pitches in characters per inch (cpi).

Expression:

P–Series CHR$(1);"[";CHR$(n);"q";

Serial Matrix CHR$(27);"[";CHR$(n);"q";

where:
- n = Print Mode/Pitch code (Values other than shown in Table 6–8 below are ignored.)
- q = Command sequence terminator

Comment: Refer to Table 6–8 to identify Print Mode/Pitch selections allowed. A complete table identifying print rates, pitch, and dot densities for all print modes is located in the Appendix B.

You can also select print mode and pitch from the control panel. When the MODE switch is pressed, the print mode/pitch change control code from the host computer overrides the control panel print mode setting, and the print mode and pitch selection is reflected on the message display.

NOTE: The print mode must be changed before the first printable symbol of a print line or the command sequence is deferred until the next line.

Table 6–8. Print Mode/Pitch Codes

	PRINT MODE:	Data Processing (DP)	Correspondence (NLQ)	High Speed A (HS)	Barcode 145	Barcode 160
n (dec):	**n (hex):**	**Characters per inch (cpi):**				
1(49)	**1(31)**	–	10	–	–	–
2(50)	**2(32)**	10	–	–	–	–
3(51)	**3(33)**	–	–	12	–	–
4(52)	**4(34)**	–	–	–	12.1	–
5(53)	**5(35)**	–	–	–	–	13.3

Printer Select

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	DC1	11	17

Purpose Places printer in the selected state.

Comment When the configuration parameter PRINTER SELECT is enabled, this control code allows the printer to receive and print data from the host.

Printer Deselect (code DC3) disables the printer from receiving data.

Printer Deselect

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	DC3	13	19

Purpose Places printer in the deselected state.

Comment When the configuration parameter PRINTER SELECT is enabled, this control code disables the printer from receiving and printing data from the host. Until a DC1 (Printer Select) command is received, all subsequent data to the printer is ignored.

NOTE: When the configuration parameter PRINTER SELECT is enabled and saved in NOVRAM, the printer powers up in the deselected state.

Skip–Over Perforation

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC N n	1B 4E n	27 78 n

Purpose Selects the number of lines (at the current line spacing) for the paper “skip” at the bottom of the perforated page.

where n = 1 to 127 to select the number of lines to skip. If the value of **n** exceeds the current forms length, it is ignored.

Comment The actual distance set is the product of **n** and the current line spacing. The factory default value is to disable skip–over perforation. You can specify the default value. Setting a new forms length (ESC C) resets skip–over perforation to zero.

This feature is disabled whenever vertical tabs are set.

You can also select skip–over perforation from the control panel; however, vertical tabs within the skip–over perforation zone, as set by the control panel, are ignored. The control code skip–over perforation setting from the host computer overrides the control panel setting.

Skip–Over Perforation Cancel

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC O (alpha O)	1B 4F n	27 79 n
Purpose	Resets skip–over perforation to zero.		

Superscript/Subscript Printing

	ASCII	Hex	Decimal
P–Series	SFCC S n	SFCC 53 n	SFCC 83 n
Serial	ESC S n	1B 53 n	27 83 n

Purpose Selects superscript or subscript printing.

Comment Super/Subscript font prints at one–half the normal vertical character height and at twice the normal vertical density. When the super/subscript control code is received, all characters are superscript or subscript until this feature is reset by the super/subscript reset control code or printer reset. Emphasized print is ignored in the super/subscript print mode.

In Serial Matrix protocol, or when the BS feature is enabled from the control panel in P–Series protocol, both superscript and subscript characters can print in the same character column using the Backspace (BS) control code (page 6–7).

Use caution when combining Superscript or Subscript printing with other print attributes such as Elongated (Double High), or small line spacing; overlapping lines may occur. Characters with different horizontal or vertical dot densities do not overlap.

Example The following sample program illustrates superscript/subscript printing and reset.

```
10 LPRINT "Control Code ESC S 0 selects";
20 LPRINT CHR$(27);"S";CHR$(0);" SUPERSCRIPT";CHR$(27);"T"
30 LPRINT "A";CHR$(27);"S";CHR$(0);"2";CHR$(27);"T";
40 LPRINT "+B";CHR$(27);"S";CHR$(0);"2";CHR$(27);"T";
50 LPRINT "=C";CHR$(27);"S";CHR$(0);"2";
60 LPRINT CHR$(27);"T"
70 LPRINT "Control Code ESC S 1 selects";
80 LPRINT  CHR$(27);"S";CHR$(1);" SUBSCRIPT";CHR$(27);"T"
90 LPRINT "31";CHR$(27);"S";CHR$(1);"HEX";CHR$(27);"T";
100 LPRINT "=48";CHR$(27);"S";CHR$(1);"DEC";
110 LPRINT CHR$(27);"T"
120 LPRINT "Control Code ESC T cancels"
130 LPRINT "superscript/subscript printing."
```

```
Control Code ESC S 0 selects SUPERSCRIPT
A2+B2=C2
Control Code ESC S 1 selects SUBSCRIPT
31HEX=48DEC
Control Code ESC T cancels
superscript/subscript printing.
```

Superscript/Subscript Printing Reset

	ASCII	Hex	Decimal
P–Series	SFCC T	SFCC 54	SFCC 84
Serial	ESC T	1B 54	27 84
Purpose	Resets superscript and subscript printing.		
Comment/ Example	See the Superscript/Subscript control code example for an example of superscript/subscript reset.		

Underline

	ASCII	Hex	Decimal
P–Series	SFCC – n	SFCC 2D n	SFCC 45 n
Serial	ESC – n	1B 2D n	27 45 n

Purpose Enables or disables automatic underlining of all characters.

where n = 0 to disable automatic underlining (hex 00 or hex 30)
n = 1 to enable automatic underlining (hex 01 or hex 31)

Comment When automatic underline is enabled, all characters, including spaces, are underlined until underlining is disabled.

Example The following sample program illustrates automatic underlining and underlining reset.

```
10 LPRINT "Control code ESC -1"
20 LPRINT CHR$(27);"-";CHR$(1);
30 LPRINT "enables automatic underlining."
40 LPRINT "Control code ESC -0"
50 LPRINT CHR$(27);"-";CHR$(0);
60 LPRINT "disables automatic underlining."
```

```
Control code ESC -1
enables automatic underlining.
Control code ESC -0
disables automatic underlining.
```

	ASCII	Hex	Decimal
P–Series	Refer to the Vertical Format Units chapter.		
Serial	N/A	N/A	N/A

NOTE: If the SFCC being used is ESC, the PI line must be set high when using the EVFU.

Purpose Load and execute the VFU.

Comment Refer to the Vertical Format Units chapter for details.

Vertical Tab

	ASCII	Hex	Decimal
P–Series/ Serial	VT	0B	11

Purpose Prints the data in the buffer and advances the paper to the next vertical tab position.

Comment In the P–Series emulation mode, if a vertical tab format is defined in the EVFU (channel 12), or DVFU (channel 2) and the VFU is enabled, the paper is moved to the next vertical tab position.

In the Serial Matrix printer protocol, vertical tab positions are set by control code ESC B and executed by control code VT. In this mode, if Vertical Tabs are loaded, the paper moves to the next vertical tab position.

If a vertical tab format is not defined, the paper is advanced to the next line at the current line spacing. If a vertical tab format is defined but no vertical tab positions are set between the current print position and the end of the form, the paper is advanced to the top of the next form. The VT code resets all single line print attributes. More information on Vertical Tabs is provided in the Vertical Format Units chapter.

Vertical Tab Set/Clear (Serial Matrix)

	ASCII	Hex	Decimal
P–Series	N/A	N/A	N/A
Serial	ESC B n	1B 42 n	27 66 n

Purpose Sets vertical tab positions.

Expression CHR$(27);"B";CHR$(n);...CHR$(nk);CHR$(0);

where n1 through nk specify the line number for the vertical tab(s), for a maximum of 16 tab positions. Either CHR$(0) or CHR$(128) can be used as the sequence terminator.

Comment The physical position on the paper is the product of "n" and the current line spacing. Subsequent line spacing changes do not change the tab position. If the value of "n" defines a tab stop that exceeds the forms length, that tab position is ignored.

In Serial Matrix printer protocol, vertical tab positions are set by control code ESC B and executed by control code VT. The tab positions must be in ascending order or the sequence terminates. More information regarding Serial Matrix vertical tab setting is provided in the Vertical Format Units chapter.

If the ESC B command is followed immediately by a sequence terminator, the vertical tab positions are cleared.

CHAPTER 7

INTERFACES

Introduction

The P3000 Series printers are equipped with resident parallel and serial interfaces. Only one interface can be enabled at a time via the control panel. Only one parallel host can be connected at any time. Other optional interfaces include an Intelligent Graphics Processor (IGP), PI–3287, and PI–5225. Contact your authorized service representative for details.

This chapter describes:

Dataproducts Parallel Interface

This interface allows the printer to operate with controllers designed for Dataproducts printers using a 50–pin AMP Ampilite HDH–20 type connector. The maximum data line length (cable length) from the controller (host computer) to the printer is 40 feet. An adapter cable to accept the 50–pin Winchester MRAC50P connector is also available from your authorized service representative.

Dataproducts Interface Signals

Table 7–1 lists the Dataproducts interface connector pin assignments. Dataproducts compatible interface signals between the computer and the printer are defined as follows:

Ready Line – A high true signal from the printer indicating AC power and DC voltages are present, paper is loaded properly, and the printer is not in a check condition.

On Line – A high true signal from the printer indicating the Ready Line is true and the ON LINE switch on the control panel has been activated. The printer is ready to accept data from the host.

Data Request – A high true signal from the printer indicating the printer is ready to accept character data from the host. The signal changes to false shortly after the leading edge of the data strobe signal.

Data Strobe – A high true pulse from the host indicating data is ready. The data strobe remains high until the Data Request line goes false. The active edge of the strobe signal can be configured for either leading (default) or trailing.

Data Lines – Eight standard or inverted levels from the host that specify character data, plot data, or a control code. Sensing Data Line 8 is controlled by printer configuration.

Paper Instruction (PI) – Optional standard or inverted level EVFU or DVFU signal from the host with the same timing and polarity as the data lines. PI line sensing is controlled by printer configuration.

NOTE: The PI line must be disabled (configuration option selected from the control panel) if the host computer does not drive or control the PI line. If the line is not controlled by the host and sensing is enabled, rapid paper slewing will occur.

Interface Verification – Two pins on the interface connector jumpered together to verify proper installation of the interface connector.

Table 7–1. Connector Pin Assignments for Dataproducts Interface with AMP Connector

OUTPUT		INPUT	
Signal	**Pin**	**Signal**	**Pin**
Ready	22	Data Line 1	19
Return	6	Return	3
On Line	21	Data Line 2	20
Return	5	Return	4
Data Request	23	Data Line 3	1
Return	7	Return	2
I/F Verif.	45, 46	Data Line 4	41
		Return	40
Paper Instr.	30	Data Line 5	34
Return	14	Return	18
		Data Line 6	43
		Return	42
		Data Line 7	36
		Return	35
		Data Line 8	28
		Return	44
Pins not listed are not connected.		Data Strobe	38
		Return	37

Dataproducts Parallel Interface Configuration

The printer is configured at the factory according to the specified interface. However, printer configuration can be changed. The following configuration parameters can be verified or changed as necessary to meet specific application requirements:

- Data Bit 8 (enable or disable)
- PI line (enable or disable)
- Data Polarity (standard or inverted)
- Response Polarity (standard or inverted)

- Strobe Polarity (standard or inverted)
- Latch Data On Leading or Trailing Edge of Strobe

These parameters are displayed under the Application Compatibility/Host Interface/Dataproducts submenu from the control panel. Refer to Control Panel Configuration Diagram in the Configuration chapter for information on selecting the various parameter values.

Based on the application, a unique configuration may be required. If the printer is not working properly for the configuration selected, contact your authorized service representative.

NOTE: The PI line must be disabled from the control panel if the host computer does not drive or control the PI line. If the line is not controlled by the host and sensing is enabled, rapid paper slewing will occur.

Centronics Parallel Interface

This interface enables the printer to operate with controllers designed for buffered Centronics printers. The maximum data line length (cable length) from the controller (host computer) to the printer is 40 feet.

Centronics Interface Signals

Table 7–2 lists the Centronics interface connector pin assignments. Centronics interface signals between the computer and the printer are defined as follows.

PE – A high true level from the printer indicating the printer is in a check condition.

SLCT – A high true level from the printer indicating the printer is ready for data transfer and the ON LINE switch has been activated.

Busy – A high true level from the printer indicating the printer cannot receive data.

ACKNLG – A low true pulse from the printer indicating the character or function code has been received and the printer is ready for the next data transfer.

Data Strobe – A low true, 100 ns min. pulse from the host to clock data into the printer.

Data Lines – Eight standard or inverted levels from the host that specify a character or function code. Sensing Data Line 8 is controlled by printer configuration.

Paper Instruction (PI) – Optional EVFU or DVFU control signal from the host with the same timing as the data lines. Sensing the PI line is controlled by printer configuration.

NOTE: The PI line must be disabled from the control panel if the host computer does not drive or control the PI line. If the line is not controlled by the host and sensing is enabled, rapid paper slewing will occur.

Table 7–2. Centronics Interface Connector Pin Assignments

INPUT SIGNALS		OUTPUT SIGNALS	
Signal	**Pin**	**Signal**	**Pin**
Data Line 1	2	ACKNLG	10
Return	20	Return	28
Data Line 2	3		
Return	21	SLCT	32, 13
Data Line 3	4		
Return	22	PE	12
Data Line 4	5		
Return	23	Busy	11
		Return	29
Data Line 5	6		
Return	24	Chassis Ground	17
Data Line 6	7		
Return	25	Spare	30,31, 34,35, 36
Data Line 7	8		
Return	26		
Data Line 8	9		
Return	27		
Paper Instruction	15		
Return	14		
Data Strobe	1		
Return	19		

Centronics Parallel Interface Configuration

The printer is configured at the factory according to the specified interface. However, the configuration is also user selectable. The following configuration parameters can be verified or changed as necessary to meet specific application requirements:

- Data Bit 8 (enable or disable)
- Data Polarity (standard or inverted)
- PI line (enable or disable)
- Response Polarity (standard or inverted)
- Latch Data On Leading or Trailing Edge of Strobe

These parameters are displayed under the Application Compatibility/Host Interface/Centronics submenu selectable from the control panel. Refer to the Control Panel Configuration Diagram in the Configuration chapter for information on selecting the various parameter values.

Alternate Terminating Resistors

For parallel interface configurations, the printer is equipped with 1K ohm pullup terminating resistors located at board coordinates 20D on the Controller PCBA. (The printer outputs are also pulled up with a 1K resistor pack on the Controller.) Generally, the 1K ohm terminating resistors are suitable for most applications. If, however, the standard terminating resistor pack is not compatible with the particular interface driver requirements of the host, other values of pullup/pulldown resistors may be necessary. *Printronix* provides the 220 ohm pullup and 330 ohm pulldown alternate terminating resistors. If the 220 ohm pullup resistor is used, the 330 ohm pulldown resistor should be used with it.

Installing the alternate terminating resistors requires three main procedures listed below and explained in the following sections.

- Remove Printer Cabinet (Pedestal Model) or Remove Paper Guide (Floor Cabinet Model)
- Remove Controller Board and Install Terminating Resistors
- Restore Printer to Operation

Remove Printer Cabinet (Pedestal Model)

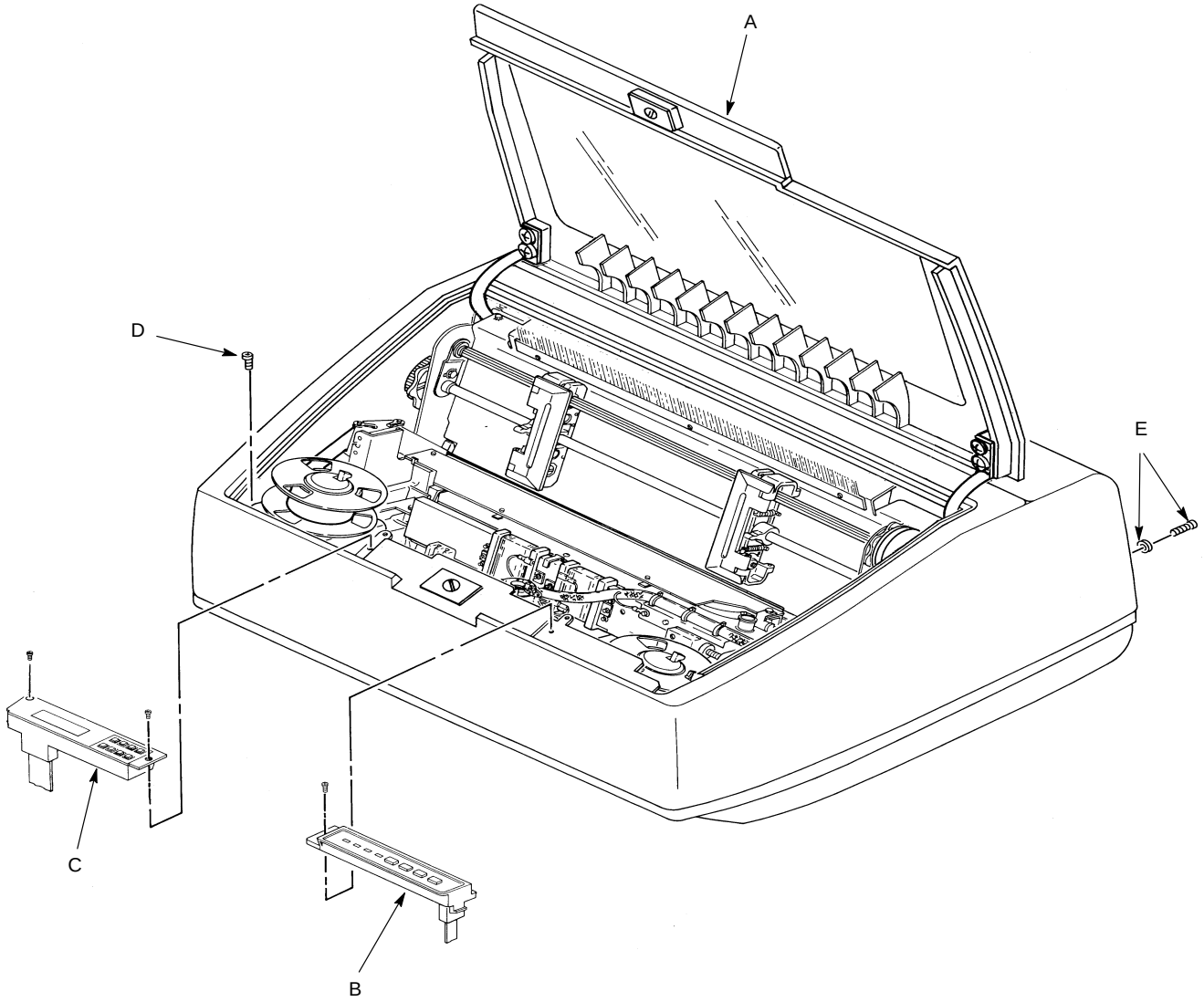
To remove the printer cabinet, perform the following steps and refer to Figure 7–1.

1. Turn off the printer power, disconnect the AC power cord, and open the printer cover (A).
2. Loosen the captive screw securing the control panel (B) and the two captive screws securing the display control panel (C) to the printer. Set the panels inside printer cabinet.
3. Loosen the two Phillips head screws (D) securing the cabinet cover to the printer base located at the inside front right and left corners.
4. Loosen the two Phillips head screws and washers (E) on the outside rear of the cabinet cover.
5. Close printer cover (A) and carefully lift the cabinet off printer base.
6. Proceed to Remove the Controller Board section on page 7–8.

Remove Paper Guide Assembly (Floor Cabinet Model)

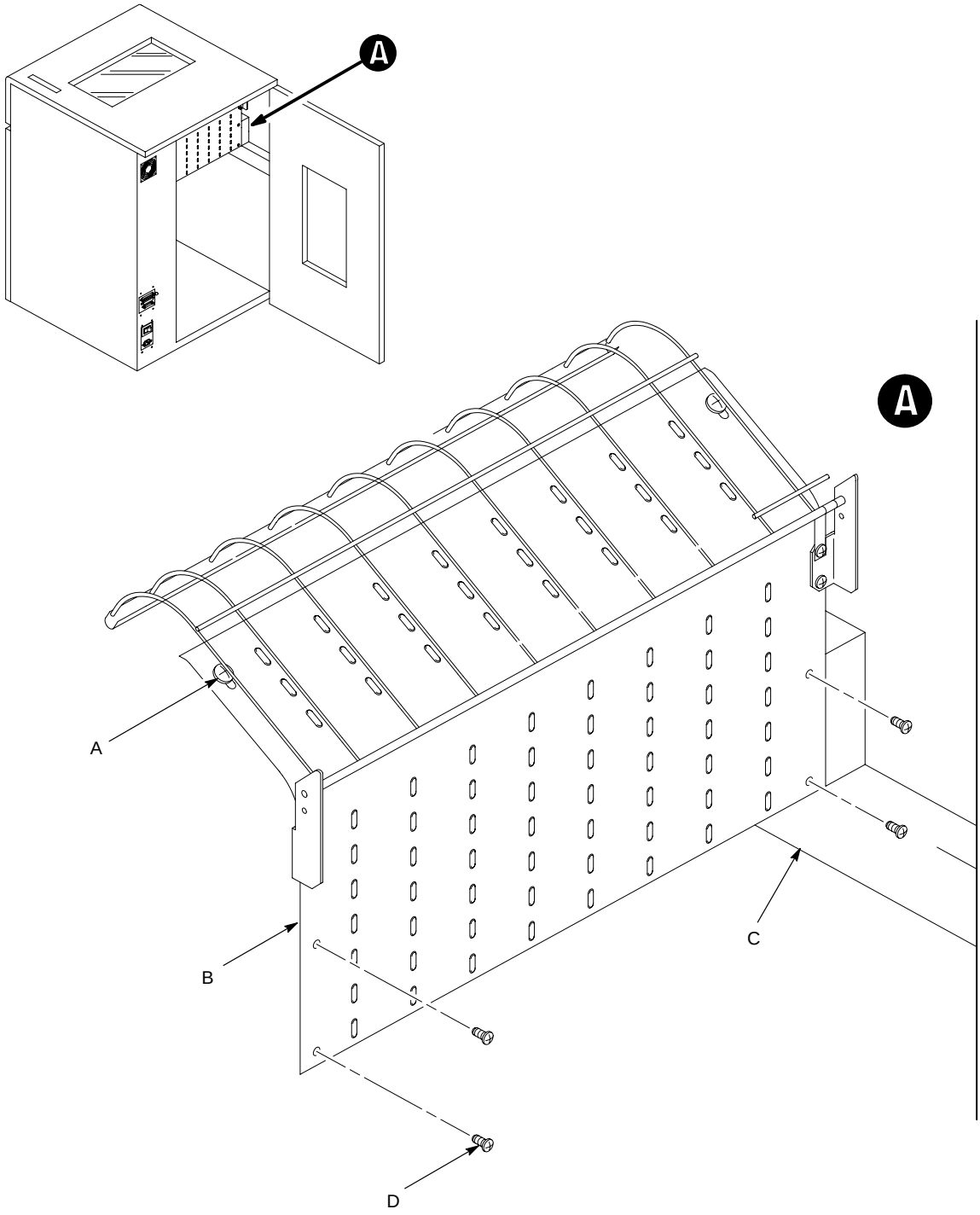
To remove the paper guide assembly from the floor cabinet model, perform the following steps and refer to Figure 7–2.

1. Turn off the printer power, disconnect the AC power cord, and open the printer cover and the rear door.
2. From the front of printer, loosen, but do not remove, the two upper attachment screws (A) securing the paper guide assembly (B) to the printer base (C).
3. From the rear of printer, remove lower four attachment screws (D) securing the paper guide assembly (B) to the printer base (C).
4. Lift off the Paper Guide Assembly (B).



Note: Loosen, do not remove, the screws securing the control panels to the printer.

Figure 7–1. Printer Cabinet Removal (Pedestal Model)



NOTE: Loosen, but do not remove, the two upper attachment screws securing the paper guide assembly to the printer base.

Figure 7–2. Paper Guide Assembly Removal (Floor Cabinet Model)

Remove Controller Board and Install Terminating Resistors

To install the alternate terminating resistors, perform the following steps and refer to page Figure 7–3.

1. Loosen three screws from the rear of the EMI shield cover (A). Remove EMI shield cover.
2. Firmly grasp the Controller board (B) and lift it straight up to unseat the connectors at the printer base.
3. Open the latches on connector P4 (C) and disconnect the J4 connector (D).
4. Remove the 1K ohm resistor pack from the socket at location 20D on the Controller board.
5. Plug the 220 ohm resistor pack into the socket at location 20D.
6. Plug the 330 ohm resistor pack into the socket at location 20E.
7. Connect connector J4 (D) and close the latches on connector P4 (C).
8. Position the Controller board (B) in the printer base. Do *not* seat Controller board into base connectors.

❑ CAUTION ❑

Do not use Mechanism Driver heat sink as a handle when removing or installing the Mechanism Driver board. Damage may result.

❑ VORSICHT ❑

Das Wärmeschild des Steuergliedes für deu Mechanismus nicht als Handgriff benützen, wenn das PCBA Mechanismus Steuerglied ein oder ausgebaut wird. Schaden könnte entstehen.

9. Position the I/O cable (F) between the Mechanism Driver board (E) and the Controller board (B).
10. Install the controller board (B) onto printer base connectors.
11. Install the EMI shield cover (A) and tighten the three screws.

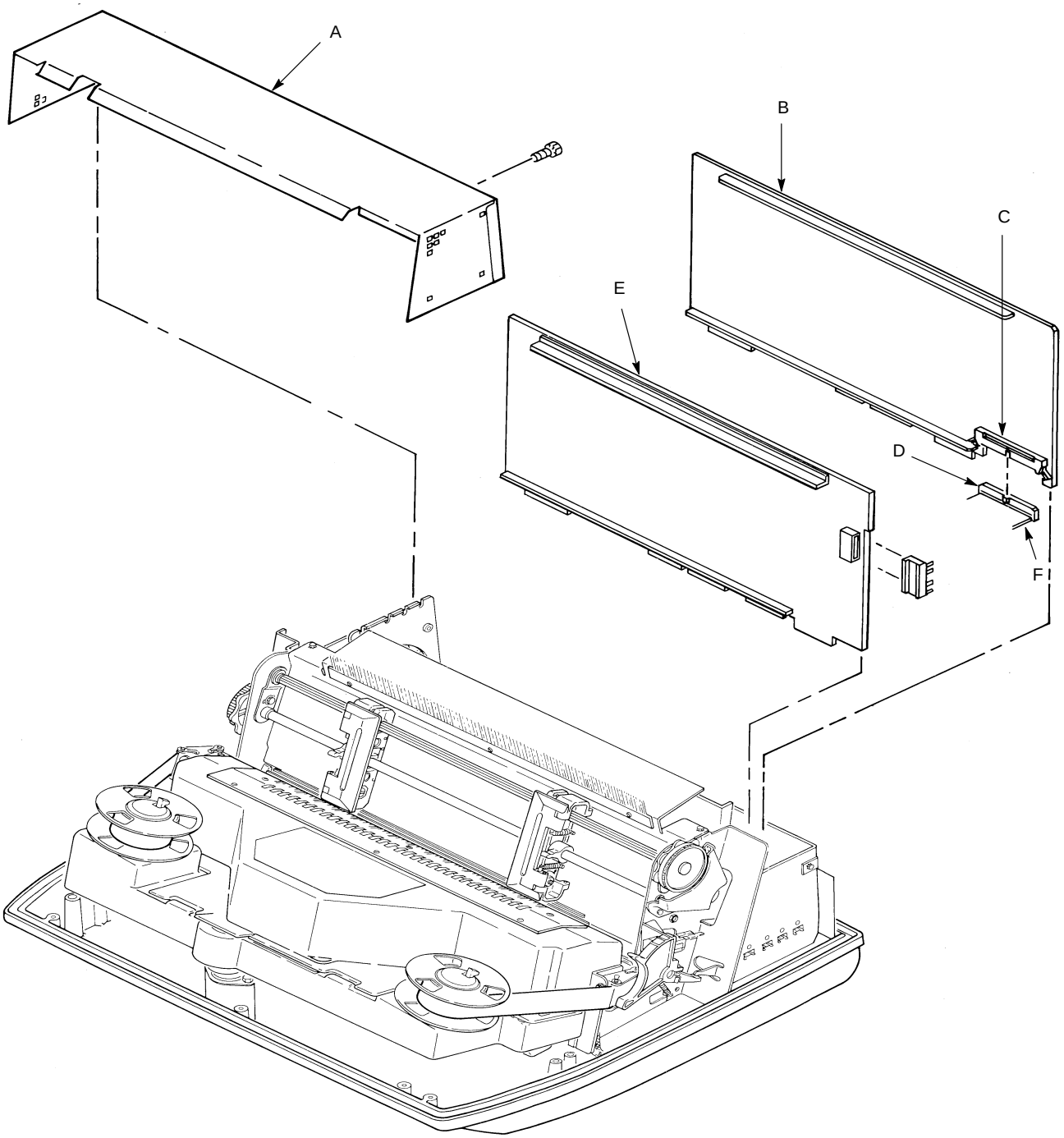


Figure 7–3. Controller Board Access (Pedestal and Floor Cabinet Models)

Restore Printer to Operation (Pedestal Model)

To re–install the printer cabinet cover on pedestal models, perform the following steps and refer to Figure 7–1 on page 7–6.

1. Place printer cabinet on printer base.
2. Tighten the two Phillips head screws and washers (E) on the outside rear of the cabinet cover.
3. Tighten the two Phillips head screws (D) securing the cabinet cover to the printer base located at the inside front right and left corners.
4. Tighten the three screws securing the control panel (B) and the display control panel (C) to the printer.
5. Connect the power cord.

Restore Printer to Operation (Floor Cabinet Model)

To re–install the paper guide assembly to floor cabinet models, perform the following steps and refer to Figure 7–2 on page 7–7.

1. From the front of printer, position keyhole slots of Paper Guide Assembly (B) over the upper attachment screws (A).
2. From the rear of printer, line up the four holes on the back side of the Paper Guide Assembly (B) and insert four screws (D) and tighten to the printer base (C).
3. Tighten the two upper attachment screws (A) to the printer base (C).
4. Close the printer cover and rear door.
5. Connect the AC power cord and turn on printer power.

RS–232 Serial Interface

This interface enables the printer to operate with bit serial devices compatible to an RS–232C controller. The input serial data transfer baud rate is selectable from the control panel. Baud rates (Baud: bits per second) of 150, 300, 600, 1200, 2400, 4800, 9600, or 19,200 are available. Baud rates are selected from the control panel. The input format consists of a single start bit, 7 or 8 data bits, and one or two stop bits. The number of data bits is determined by printer configuration. The data bits are interpreted with the least significant bit first. Parity checking is determined by printer configuration setup options selected from the control panel.

The printer interface uses a first–in/first–out buffer. The asynchronous interface accepts data as it is provided by the host computer. The maximum data line length (cable length) from the controller (host computer) to the printer is 50 feet. The interface circuit characteristics are compatible with the Electronic Industry Association Specification (EIA–232C).

RS–232 Interface Signals

The RS–232 connector mounted on the printer is a 25 pin DB–25S type. The mating connector is a DB–25P. Signal Pin assignments are listed in Table 7–3. RS–232 compatible serial interface signals are defined as follows:

Received Data – Serial data stream to the printer.

Transmitted Data – Serial data stream from the printer for transmitting status and control information to the host. Subject to protocol selection.

Request To Send (RTS) – Control signal from the printer. Subject to configuration.

Clear To Send (CTS) – Status signal to the printer indicating the host is ready to receive data/status signals from the printer.

Data Set Ready (DSR) – Status signal to the printer indicating the host is in a ready condition.

Carrier Detect (CD) – Status signal to the printer. The ON condition is required for the printer to receive data. Available as a configuration setup option.

Reverse Channel – Control signal from the printer. Subject to configuration.

Data Terminal Ready (DTR) – Control signal from the printer. Subject to configuration.

Table 7–3. Serial Interface Pin Assignments

INPUT SIGNALS		OUTPUT SIGNALS	
SIGNAL	**PIN**	**SIGNAL**	**PIN**
Received Data	3	Transmitted Data	2
Clear To Send	5	Request To Send	4
Data Set Ready	6	Reverse Channel Send	11, 14
Carrier Detect	8	Data Terminal Ready	20
		Chassis Ground	1
		Signal Ground	7

RS–232 Serial Interface Protocols

The following serial interface protocol characters are available. The protocol is configuration selectable from the control panel to meet host interface requirements.

X–ON/X–OFF – The printer transmits an X–ON character (hex 11) when entering the on line state or when the buffer is almost empty. The printer transmits an X–OFF character (hex 13) when entering the off line state or when the buffer is almost full.

DTR (Data Terminal Ready) – Control signal from the printer. (Subject to configuration.) Configurations include: always true, always false, true if on line and buffer not full, and true if off line or buffer almost full. When the printer is off line or when its buffer is almost full, DTR is toggled. When the printer is ready to receive data, DTR is toggled back.

ETX/ACK – With ETX/ACK protocol selected, the printer interface operates in a block structured mode. The host sends a block of data in response to an ACK character (hex 06) sent from the printer. The host marks the end of the block of data with an ETX character (hex 03). When the printer recognizes the ETX character, the printer releases the data block to be printed and checks the space available in the buffer. If space is available for the next block of data, the printer sends ACK to the host. If space is not available, the printer withholds ACK until sufficient space is available.

ACK/NAK – With ACK/NAK protocol selected, the printer responds as described for ETX/ACK protocol except the printer monitors the received data for parity error. If a parity error is detected, a NAK character is transmitted to the host upon receipt of the ETX character. The host is expected to repeat the data transmission.

RS–232 INTERFACE ERROR – With an odd or even parity check in effect, the detected character error shall be replaced with a question mark (?). If a parity error is detected, a NAK character (hex 15) is transmitted to the host when the ACK/NAK protocol is selected. When parity is not checked, parity errors are ignored and the characters are printed as received. Parity checking is a configuration option selected from the control panel. When a framing error occurs, an exclamation point (!) prints. When a data overrun error occurs, an asterisk (*) prints. After 20 successive errors have been received, a line feed is added which forces printing to occur.

RS–232 Serial Interface Configuration

The printer is configured at the factory. However, the configuration is also user selectable. The following configuration parameters can be verified or changed as necessary to meet specific application requirements:

- Data Protocol of hardware (DTR, Reverse Channel, or RTS), or X–ON/X–OFF, ACK/NAK or ETX/ACK
- Data Rate (baud rate selected from the control panel)
- Data Word Length (7 or 8 bits)
- Stop Bits (1 or 2 bits)
- Parity (odd, even, or none)
- Bit 8 Function (font select, PI line, or ignore)
- CD and CTS signal (enable or disable)
- DSR signal (enable or disable)
- Data Terminal Ready response logic
- Request to Send response logic
- Reverse Channel response logic

These parameters are displayed under the Application Compatibility/Host Interface/Serial RS–232 submenu selectable from the control panel. Refer to the Control Panel Configuration diagram in the Configuration chapter for detailed information on selecting the various parameter values.

NOTE: Do not use the bit 8 function to set the PI line if the host does not use it for paper control; rapid paper slewing may occur.

CHAPTER 8
ROUTINE SERVICE & DIAGNOSTICS

Introduction

The printer requires no maintenance beyond regular general cleaning. Periodically remove excess paper chaff and dust from the ribbon and paper paths. If print quality or paper motion deteriorates seriously, contact your authorized service representative for prompt attention.

This chapter presents the following routine service and diagnostic information:

General Cleaning

The printer requires periodic cleaning to ensure efficient operation and clear print quality. Clean the printer approximately every three months or after 250 hours of operation. If the printer is located in a particularly dusty area, or is used for heavy duty printing, a shorter cleaning interval is recommended.

The following cleaning procedures are applicable for pedestal and floor cabinet model printers.

❑ **WARNING** ❑

Disconnect the power source before cleaning the printer.

❑ **WARNUNG** ❑

Vor dem Säubern des Druckers ist die Netzverbindung zu unterbrechen.

Exterior Cleaning

Clean the cabinet exterior with a soft, lint–free cloth and mild detergent. (Dishwashing liquid works well.) Do not use abrasive powders or strong cleaning agents. Clean the clear windows with plain water or mild window cleaner. Always apply the cleaning solution to the cloth; never pour the cleaner directly onto the printer. Vacuum the ventilation slots at the rear of the printer cabinet.

Interior Cleaning

Paper chaff and ink accumulation inside the printer is normal during printer operation. However, excessive paper chaff and ink accumulation can degrade printer performance and print quality. Most paper chaff accumulates around the ends of the platen and ribbon path.

To clean the interior of the printer, perform the following steps and refer to Figure 8–1.

1. Turn off the printer power and unplug the printer.
2. Raise the printer top cover.
3. Fully raise the Forms Thickness Adjustment Lever (A) to open the platen.
4. Remove all paper.
5. Squeeze locking latch (B) and lift ribbon spools from the ribbon hubs.
6. Using a soft–bristled brush, clear paper chaff and dust from the paper path and platen ends.
7. Using a soft–bristled brush, clear chaff and dust from the ribbon guides (C). Vacuum up residue, paying particular attention to the tractor areas, hammer bank and printer base pan.

❑ CAUTION ❑

Vacuum carefully around the hammer bank and surrounding area to avoid damage.

❑ VORSICHT ❑

Sehr vorsichtig um die Hammer Bank und Umgebung herum staubsaugen, um Schaden zu vermeiden.

8. Wipe spline shaft (D) with a soft cloth.
9. Using a cloth dampened with alcohol, clean ribbon guides (C) at each side of the cabinet. Do not let alcohol drip into the hammer bank.

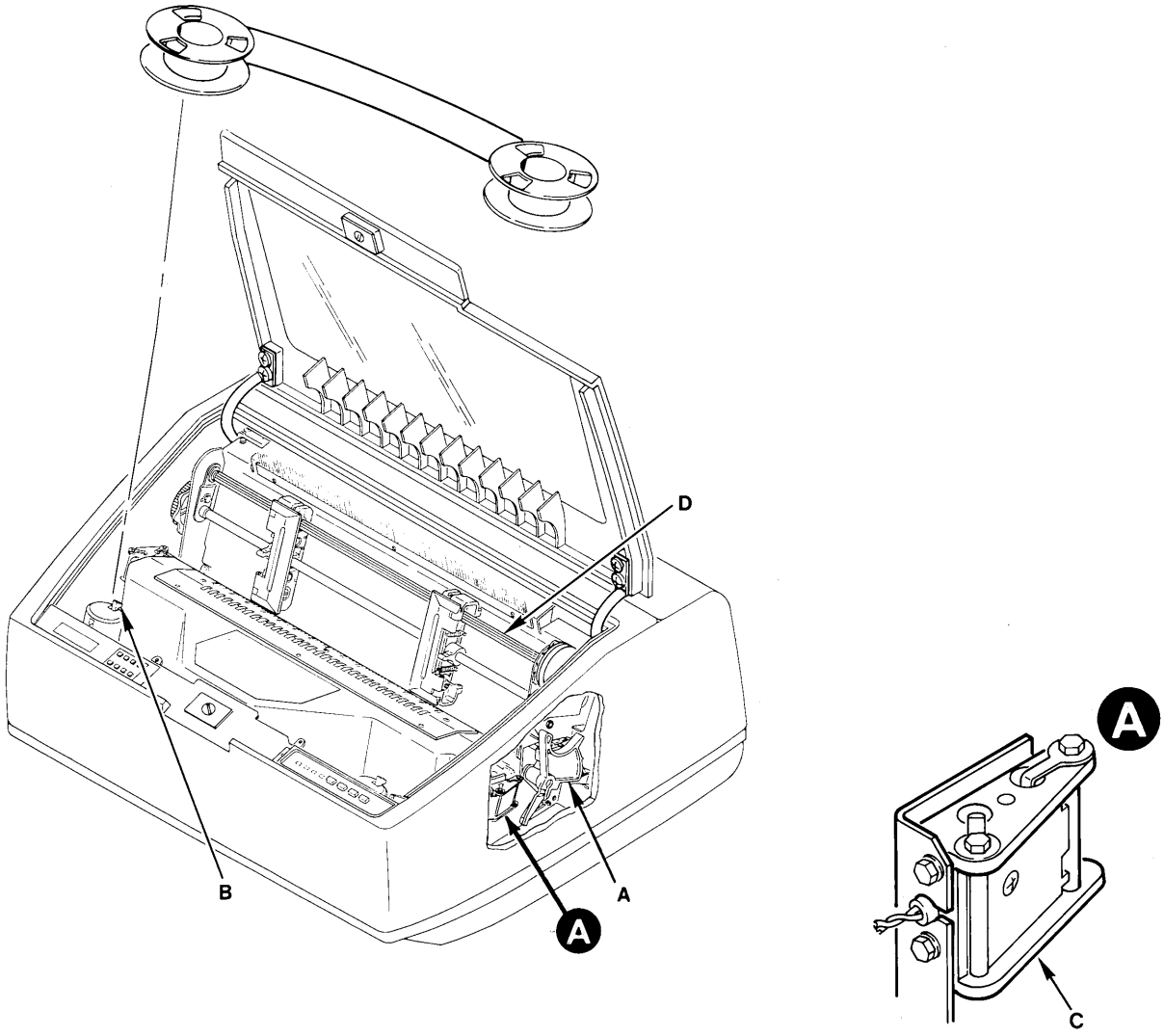


Figure 8–1. Interior Cleaning

Printer Self–Tests

The printer contains several self–tests that are helpful in maintaining optimum printer performance. Each of these tests is initiated from the DIAGNOSTICS/PRINTER TEST 8 INCH WIDTH or DIAGNOSTICS/PRINTER TEST FULL WIDTH configuration menus. Select additional printer tests (i.e., stroke time, shuttle rebound, and hammer phasing) from the DIAGNOSTICS/SERVICE AIDS configuration menu. Available self–tests are as follows:

- Shift Recycle
- All E's
- E's plus TOF
- All H's
- Underline Only
- Black Plot
- Shuttle / Ribbon

Shift Recycle – a “sliding” alphanumeric pattern useful in identifying missing or malformed characters, improper vertical alignment, or vertical compression.

All E’s – a pattern of all uppercase letter E’s useful in identifying missing characters, misplaced dots, smeared characters, improper phasing problems, or light/dark character variations.

E’s plus TOF – a pattern of all E’s followed by a form feed to the next page top–of–form, useful in identifying high speed paper motion feeding problems.

All H’s – a pattern of all uppercase letter H’s useful in detecting missing characters, misplaced dots, smeared characters, or improper phasing.

Underline Only – an underline pattern useful in identifying vertical hammer tip misalignment.

Black Plot – all odd dot positions are printed. This is useful in identifying horizontal hammer tip misalignment.

Shuttle / Ribbon – a test that verifies proper operation by exercising shuttle and ribbon motion. This is useful for spooling action without print and ribbon guide alignment.

Running the Self–Tests

The P3000 printers include various self–test functions. Use the self–test as needed to determine if the printer is functioning normally.

To run the self–tests:

1. Place the printer off line and raise the printer cover.
2. Press MENU DOWN; repeatedly press NEXT or PREV VALUE until DIAGNOSTICS is displayed.
3. Press MENU DOWN, then repeatedly press NEXT or PREV VALUE until either PRINTER TEST FULL WIDTH or PRINTER TEST 8 INCH WIDTH is displayed.
4. To select one of the 8 INCH WIDTH or FULL WIDTH paper tests, press MENU DOWN then repeatedly press NEXT or PREV VALUE until the appropriate test displays. Tests include Shift Recycle, All E’s, E Plus TOF, All H’s, and others (described in the Configuration chapter).
5. Press R/S to begin the selected self–test; press R/S again to stop the test.

Examine the print quality. The characters should be horizontally and vertically aligned and correctly formed. If print quality problems exist, contact your authorized service representative.

6. Press CLEAR to place the printer off line. The display reads OFFLINE READY.
7. Close the printer cover and place the printer on line.

NOTE: Any data remaining in the buffer prints before the self–test begins.

Hex Code Printout

The hex code printout (often called a “hex dump”) is useful for debugging when troubleshooting printer data reception problems. Hex dumps list ASCII character data received from the host with the corresponding two–digit hexadecimal code. Printable characters print their assigned symbol; nonprintable characters are indicated with a period symbol. A “p” before the hex code indicates an active Paper Instruction (PI) line; a blank space before the hex code indicates an inactive PI line. To print the data stream received from the host computer in hex code with ASCII character equivalents, perform the following steps.

1. Place the printer off line and raise the printer cover.
2. Press MENU DOWN; repeatedly press NEXT or PREV VALUE until DIAGNOSTICS is displayed.
3. Press MENU DOWN, then repeatedly press NEXT or PREV VALUE until the PRINT DATA STREAM IN HEX CODE message displays.
4. Press MENU DOWN. The display shows OFFLINE HEX DUMP.
5. Press ON LINE. The display indicates that the printer is on line and in hex dump mode.
6. Send the data from the host. The hex dump prints.
7. Press ON LINE again to stop the hex dump. The display reads OFFLINE HEX DUMP.
8. Press CLEAR to return printer to OFFLINE READY.
9. Close printer cover and place the printer on line.

NOTE: Any data remaining in the buffer prints before the hex code printout starts.

Fault Messages

If a fault condition occurs in the printer, the CHECK light flashes alternately with the ON LINE indicator and the first line of the message display reads FAULT CONDITION. If configured, an alarm sounds when the fault condition occurs. The second line of the display shows the specific fault. (If the specific fault description requires two lines, the message FAULT CONDITION does not appear.)

NOTE: To turn the alarm off before the fault is cleared. press the CLEAR switch.

Fault messages, explanations, and corrective action are listed in Table 8–1. Fault messages indicate the nature and location of user– and service–correctable faults. After correcting a user–correctable fault, press CLEAR to resume printer operation.

Service correctable faults are indicated on the message display by an asterisk (*) next to the fault message. If a fault message appears, first press the CLEAR switch. If the printer returns to OFFLINE READY after a few seconds, the fault message was a false indication, and printing can continue. If a fault occurs during a paper slew, the paper motion is completed for all faults except paper jams. If the

fault message reappears after pressing CLEAR, turn the printer off and contact your authorized service representative.

❑ IMPORTANT ❑

If LOADING FACTORY DEFAULTS appears on the display every time the printer power is cycled, non–volatile memory must be replaced. You can *temporarily* bypass Non–volatile memory by pressing the CLEAR switch. However, no configuration data is saved, and the factory default is loaded. Contact your authorized service representative to correct the fault permanently.

Table 8–1. Fault Messages

Fault Displayed	Operator Correctable?	Explanation	Corrective Action
FAULT CONDITION PAPER OUT	Yes	*Paper out*	Add paper.
FAULT CONDITION PLATEN OPEN	Yes	*Platen open*	Close platen (Forms Thickness Adjustment Lever).
FAULT CONDITION PAPER JAM	Yes	*No paper motion*	Check for and remove jammed paper in paper path. Clean the paper motion detector.
FAULT CONDITION SHUTTLE STALL	Yes	*No shuttle movement or wrong speed*	Check for shuttle obstruction or twisted ribbon. If fault is not apparent, contact an authorized service representative.
FAULT CONDITION RIBBON	Yes	*Jammed ribbon*	Replace ribbon.
FAULT CONDITION DCU RAM*	No	*RAM failed intitialization test*	Contact an authorized service representative.
FAULT CONDITION MCU RAM*	No	*RAM failed intitialization test*	Contact an authorized service representative.
FAULT CONDITION NOVRAM *	No	*Non–volatile memory fault*	Contact an authorized service representative.
FAULT CONDITION FONT PROM *	No	*Font PROM failure*	Contact an authorized service representative.
** Corrective action required by authorized service representative*			

NOTE: After correcting an operator correctable fault, press the CLEAR switch before placing the printer on line.

CHAPTER 9

MULTINATIONAL CHARACTER SETS

Introduction

Four basic character set choices are selectable from the control panel: IBM PC, Multinational, DEC Multinational, and ECMA–94 Latin 1. Charts for each character set and the corresponding international language substitution chart are provided in Appendix B.

This chapter discusses the following:

Selecting the Character Set and Language

The character sets and languages within each character set are selectable via the printer control panel and are illustrated in the Multinational Character Set Structure located on page 9–4. Select the appropriate character set and language as follows:

1. At the control panel, cycle through the character set selections and select the desired character set.

2. Cycle through the international language selections available within the selected character set and select the language.

   NOTE: You can also select a language from the host computer using SFCC l, PSET, or ESC R. Refer to pages 6–19 and 6–25 in the Programming chapter for detailed information.

Selecting Extended Character Set ECMA

ECMA–94 Latin 1 is broken down into two parts: the Primary Set, defined from 20–7F hex, and the Extended Set, defined from 80–FF hex. The selection of the Extended Character Set sets the print

mode and pitch at which the Extended Character Set is printed. The print mode and pitch can be different for the Primary and Extended Character Sets. However, the Primary Set cannot be mixed with an Extended Set within the same line if the Extended Set is printing at a different print mode than the Primary Set.

When ECMA–94 Latin 1 character set is selected from the control panel, the host can send the OSET command to select the extended portion of the character set. More information on the OSET command is provided in *Character Set Select: ECMA–94 Latin 1 Extended,* located in the Programming chapter.

OCR–A and OCR–B

OCR print modes are selected from the Print Mode feature at the Print Format (Level I) of the Configuration Diagram (Configuration chapter).

OCR print modes do not contain complete character sets. Available OCR–A standard characters are dictated by American National Standard Institute (ANSI) #X3.17–1981, and OCR–A international characters are in accordance with International Organization for Standardization (ISO) #646–1973. Available OCR–B standard and extended characters are dictated by ANSI #X3.49–1975. Undefined OCR characters are replaced with spaces. When an international language substitution is selected for a non–existent character, no substitution will occur.

Downloading Languages

Downloading a Language (ESC V) allows you to define and download a character substitution table for the 224 printable symbol code points. Refer to page 6–31 in the Programming chapter. You can invoke a custom language set with ESC RX. Refer to page 6–19 in the Programming chapter.

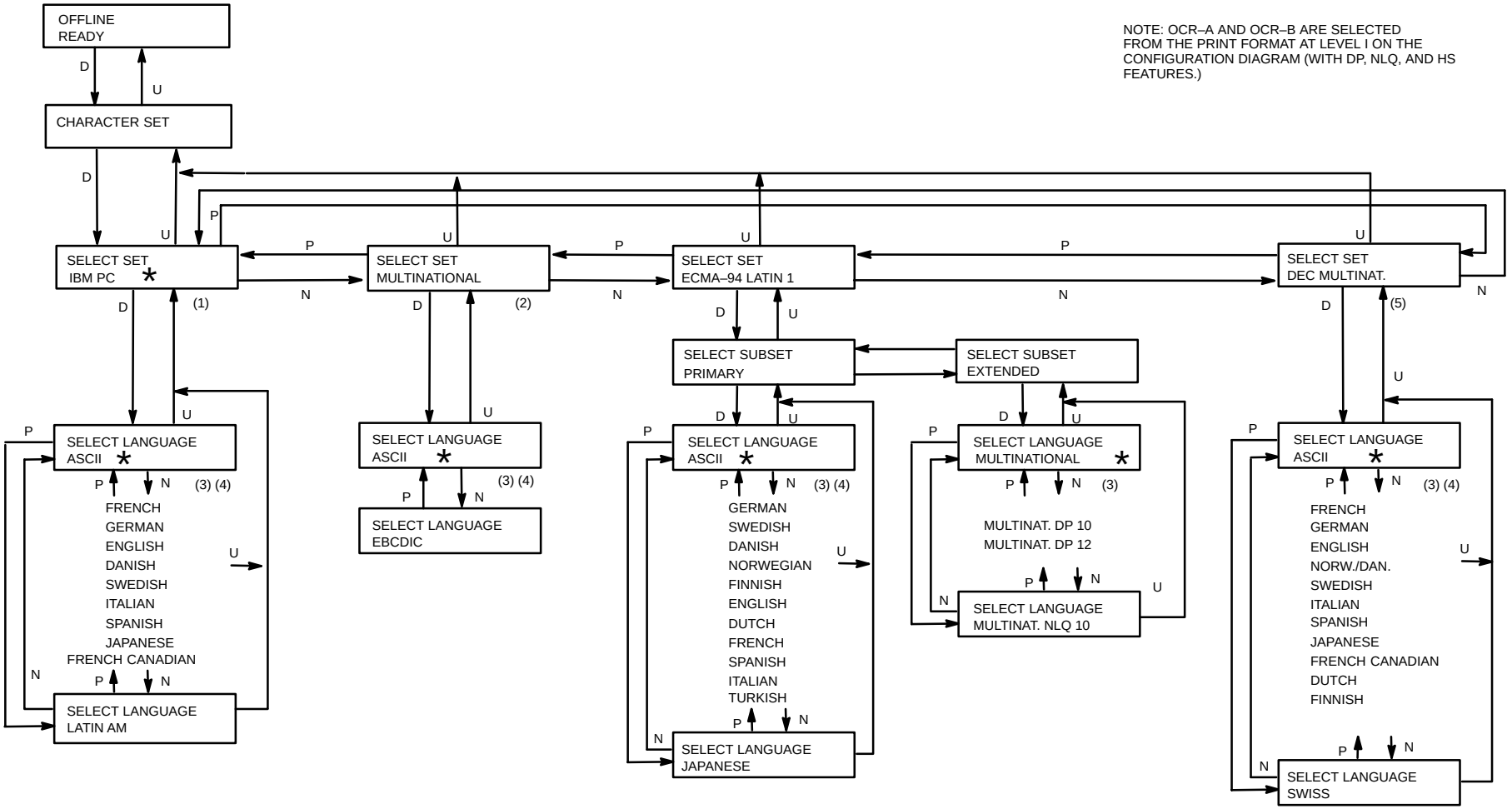
Character Set Charts and International Language Substitution Tables

The character set charts in Appendix B provide the hexadecimal character address for each character set and international language. For example, if the IBM PC Character Set and U.S. ASCII Language is selected, 0023 hex selects the Number Sign (#). If IBM PC–English language is selected, hex 0023 on the IBM–PC International Language Substitution Table will substitute the English Pound symbol for the Number Sign.

The International Language Substitution tables identify only specific character substitutions available in the selected language. Hex addresses not shown on the substitution tables use the character in the hex address shown on the standard character set chart.

The complete Character Address Table (Character Library) is shown on page 9–4. The Character Library identifies each character's location in printer memory by its *Printronix* standard hexadecimal address value (see the Numeric Character Listing starting on page 9–6or the Alphabetical Character Listing starting on page 9–14). Use the Character Address Table when you are defining a download language. If you want to print a Lowercase Beta at hex 41 instead of the Uppercase A, you would find the Lowercase Beta at location hex E1 in printer memory.

NOTE: The character examples provided in Appendix B are representative examples and not exact replications generated by the printer. Most symbols are shown in 10 cpi. Not all characters are available in all print modes.



NOTE: OCR–A AND OCR–B ARE SELECTED FROM THE PRINT FORMAT AT LEVEL I ON THE CONFIGURATION DIAGRAM (WITH DP, NLQ, AND HS FEATURES.)

(1) EXTENDED SUBSET is IBM PC GRAPHICS

(2) EXTENDED SUBSET is MULTINATIONAL

(3) Menu selections may vary when optional font PROMs are installed

(4) DOWNLOADED shall be displayed when a downloaded substitution table is active

(5) EXTENDED SUBSET is DEC MULTINATIONAL

Multinational Character Set Structure

Character Address Table (Character Library)

	00 0_	00 1_	00 2_	00 3_	00 4_	00 5_	00 6_	00 7_	00 8_	00 9_	00 A_	00 B_	00 C_	00 D_	00 E_
0	—	Ø		0	@	P	`	p	Ç	É	á	▒	└	╨	α
1	Ï	À	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	β
2	Þ	È	″	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ
3	♥	Ì	#	3	C	S	c	s	â	ô	ú	│	├	╙	π
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ̃	┤	─	╘	Σ
5	♣	§	%	5	E	U	e	u	à	ò	Ñ̃	╡	┼	╒	σ
6	♠	Ò	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ
7	¨	Ù	´	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ
8		¤	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ
9	Ð	Þ	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ
A	Á	đ	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω
B	Í	|	+	;	K	[	k	{	ï	¢	1/2	╗	╦	▉	δ
C	Ó	۵	’	<	L	\	l	¦	î	£	1/4	╝	╠	▄	∞
D	Ú	═	–	=	M	]	m	}	ì	¥	¡	╜	═	▊	ϕ
E	ý	×	.	>	N	^	n	~	Ä	₧	≪	╛	╬	▊	∈
F	Ý	ø	/	?	O	_	o	˅	Å	ƒ	≫	┐	╧	■	∩

NOTE: Not all characters are available in all print modes.

00 F_	01 0_	01 1_	01 2_	01 3_	01 4_	01 5_	01 6_	01 7_	01 8_	01 9_	01 A_	01 B_	01 C_	01 D_	01 E_
≡	Â	IJ													
±	Ê	ij													
≥	Î	ĸ													
≤	Ô	ŀ													ŧ
⌠	Û	Ğ												Œ	⊓
⌡	ã	ğ												œ	ŋ
÷	õ	Ş												ŧ	_
≈	Ã	ş												▮	I
°	Õ	ı												Ÿ	I
•	3/4														⊥
·	1														ȯ
√	3														↑
n	´														↓
2	Ë														→
▪	©														
¯	®														

Blank character addresses from 0119–01D3 and 01D9–01E2 are used in other Printronix printer models.

Numeric Character Location Listing

The complete Character Library is listed below, arranged in numeric order by hexadecimal address. Included is the decimal address and the symbol's technical name.

Hex Value	Decimal Value	Symbol Name
0000	0000	Overline
0001	0001	Uppercase I with Umlaut
0002	0002	Lowercase Thorn
0003	0003	Black Heart
0004	0004	Black Diamond
0005	0005	Black Club
0006	0006	Black Spade
0007	0007	Umlaut
0008	0008	*(used in other Printronix printer models)*
0009	0009	Uppercase Eth
000A	0010	Uppercase A with Acute Accent Mark
000B	0011	Uppercase I with Acute Accent Mark
000C	0012	Uppercase O with Acute Accent Mark
000D	0013	Uppercase U with Acute Accent Mark
000E	0014	Lowercase Y with Acute Accent Mark
000F	0015	Uppercase Y with Acute Accent Mark
0010	0016	Uppercase O with Slash
0011	0017	Uppercase A with Grave Accent Mark
0012	0018	Uppercase E with Grave Accent Mark
0013	0019	Uppercase I with Grave Accent Mark
0014	0020	Paragraph Sign
0015	0021	Section Sign
0016	0022	Uppercase O with Grave Accent Mark
0017	0023	Uppercase U with Grave Accent Mark
0018	0024	International Currency Symbol
0019	0025	Uppercase Thorn
001A	0026	Lowercase Eth
001B	0027	Solid Vertical Bar
001C	0028	Cedilla
001D	0029	Double Underline
001E	0030	Multiplication Sign
001F	0031	Lowercase O with Slash
0020	0032	Space
0021	0033	Exclamation Mark
0022	0034	Double Quote
0023	0035	Number Sign
0024	0036	Dollar Sign
0025	0037	Percent Sign

(continued)

Hex Value	Decimal Value	Symbol Name
0026	0038	Ampersand
0027	0039	Single Quote
0028	0040	Left Parenthesis
0029	0041	Right Parenthesis
002A	0042	Asterisk
002B	0043	Plus Sign
002C	0044	Comma
002D	0045	Minus Sign
002E	0046	Period
002F	0047	Slash
0030	0048	Zero
0031	0049	One
0032	0050	Two
0033	0051	Three
0034	0052	Four
0035	0053	Five
0036	0054	Six
0037	0055	Seven
0038	0056	Eight
0039	0057	Nine
003A	0058	Colon
003B	0059	Semicolon
003C	0060	Less Than Symbol
003D	0061	Equals Sign
003E	0062	Greater Than Symbol
003F	0063	Question Mark
0040	0064	At Sign
0041	0065	Uppercase A/Alpha
0042	0066	Uppercase B/Beta
0043	0067	Uppercase C
0044	0068	Uppercase D
0045	0069	Uppercase E/Epsilon
0046	0070	Uppercase F
0047	0071	Uppercase G
0048	0072	Uppercase H/Eta
0049	0073	Uppercase I/Iota
004A	0074	Uppercase J
004B	0075	Uppercase K/Kappa
004C	0076	Uppercase L
004D	0077	Uppercase M/Mu
004E	0078	Uppercase N/Nu
004F	0079	Uppercase O/Omicron
0050	0080	Uppercase P/Rho
0051	0081	Uppercase Q

(continued)

Hex Value	Decimal Value	Symbol Name
0052	0082	Uppercase R
0053	0083	Uppercase S
0054	0084	Uppercase T
0055	0085	Uppercase U
0056	0086	Uppercase V
0057	0087	Uppercase W
0058	0088	Uppercase X/Chi
0059	0089	Uppercase Y/Upsilon
005A	0090	Uppercase Z/Zeta
005B	0091	Left Bracket
005C	0092	Back Slash
005D	0093	Right Bracket
005E	0094	Circumflex
005F	0095	Underline
0060	0096	Grave Accent Mark
0061	0097	Lowercase A
0062	0098	Lowercase B
0063	0099	Lowercase C
0064	0100	Lowercase D
0065	0101	Lowercase E
0066	0102	Lowercase F
0067	0103	Lowercase G
0068	0104	Lowercase H
0069	0105	Lowercase I
006A	0106	Lowercase J
006B	0107	Lowercase K
006C	0108	Lowercase L
006D	0109	Lowercase M
006E	0110	Lowercase N
006F	0111	Lowercase O/Omicron
0070	0112	Lowercase P
0071	0113	Lowercase Q
0072	0114	Lowercase R
0073	0115	Lowercase S
0074	0116	Lowercase T
0075	0117	Lowercase U
0076	0118	Lowercase V
0077	0119	Lowercase W
0078	0120	Lowercase X
0079	0121	Lowercase Y
007A	0122	Lowercase Z
007B	0123	Left Brace
007C	0124	Broken Vertical Bar
007D	0125	Right Brace

(continued)

Hex Value	Decimal Value	Symbol Name
007E	0126	Tilde
007F	0127	Caron
0080	0128	Uppercase C with Cedilla
0081	0129	Lowercase U with Umlaut
0082	0130	Lowercase E with Acute Accent Mark
0083	0131	Lowercase A with Circumflex
0084	0132	Lowercase A with Umlaut
0085	0133	Lowercase A with Grave Accent Mark
0086	0134	Lowercase A with Ring
0087	0135	Lowercase C with Cedilla
0088	0136	Lowercase E with Circumflex
0089	0137	Lowercase E with Umlaut
008A	0138	Lowercase E with Grave
008B	0139	Lowercase I with Umlaut
008C	0140	Lowercase I with Circumflex
008D	0141	Lowercase I with Grave Accent Mark
008E	0142	Uppercase A with Umlaut
008F	0143	Uppercase A with Ring
0090	0144	Uppercase E with Acute Accent Mark
0091	0145	Lowercase AE with Ligature
0092	0146	Uppercase AE with Ligature
0093	0147	Lowercase O with Circumflex
0094	0148	Lowercase O with Umlaut
0095	0149	Lowercase O with Grave Accent Mark
0096	0150	Lowercase U with Circumflex
0097	0151	Lowercase U with Grave
0098	0152	Lowercase Y with Umlaut
0099	0153	Uppercase O with Umlaut
009A	0154	Uppercase U with Umlaut
009B	0155	Cent Sign
009C	0156	Pound Sign
009D	0157	Yen Sign
009E	0158	Peseta Sign
009F	0159	Franc Sign
00A0	0160	Lowercase A with Acute Accent Mark
00A1	0161	Lowercase I with Acute Accent Mark
00A2	0162	Lowercase O with Acute Accent Mark
00A3	0163	Lowercase U with Acute Accent Mark
00A4	0164	Lowercase N with Tilde
00A5	0165	Uppercase N with Tilde
00A6	0166	Feminine Ordinal Indicator
00A7	0167	Masculine Ordinal Indicator
00A8	0168	Inverted Question Mark
00A9	0169	Backward Not Sign

(continued)

Hex Value	Decimal Value	Symbol Name
00AA	0170	Not Sign
00AB	0171	Fraction One Half
00AC	0172	Fraction One Quarter
00AD	0173	Inverted Exclamation Mark
00AE	0174	Left Angle Quote
00AF	0175	Right Angle Quote
00B0	0176	Gray, 25% density
00B1	0177	Gray, 50% density
00B2	0178	Gray, 75% density
00B3	0179	Graphics Bar Top to Bottom
00B4	0180	Graphics Bar Left to Center Top to Bottom
00B5	0181	Graphics Bar Double Left to Center Top to Bottom
00B6	0182	Graphics Bar Left to Center Double Top to Bottom
00B7	0183	Graphics Bar Left to Center Double Center to Bottom
00B8	0184	Graphics Bar Double Left to Center Center to Bottom
00B9	0185	Graphics Bar Double Left to Center Double Top to Bottom
00BA	0186	Graphics Bar Double Top to Bottom
00BB	0187	Graphics Bar Double Left to Center Double Center to Bottom
00BC	0188	Graphics Bar Double Left to Center Double Top to Center
00BD	0189	Graphics Bar Left to Center Double Top to Center
00BE	0190	Graphics Bar Double Left to Center Top to Center
00BF	0191	Graphics Bar Left to Center Center to Bottom
00C0	0192	Graphics Bar Right to Center Top to Center
00C1	0193	Graphics Bar Left to Right Top to Center
00C2	0194	Graphics Bar Left to Right Center to Bottom
00C3	0195	Graphics Bar Right to Center Top to Bottom
00C4	0196	Graphics Bar Left to Right
00C5	0197	Graphics Bar Left to Right Top to Bottom
00C6	0198	Graphics Bar Double Right to Center Top to Bottom
00C7	0199	Graphics Bar Right to Center Double Top to Bottom
00C8	0200	Graphics Bar Double Right to Center Double Top to Bottom
00C9	0201	Graphics Bar Double Right to Center Double Center to Bottom
00CA	0202	Graphics Bar Double Left to Right Double Top to Center
00CB	0203	Graphics Bar Double Left to Right Double Center to Bottom
00CC	0204	Graphics Bar Double Right to Center Double Top to Bottom
00CD	0205	Graphics Bar Double Left to Right

(continued)

Hex Value	Decimal Value	Symbol Name
00CE	0206	Graphics Bar Double Left to Right Double Top to Bottom
00CF	0207	Graphics Bar Double Left to Right Top to Center
00D0	0208	Graphics Bar Left to Right Double Top to Center
00D1	0209	Graphics Bar Double Left to Right Center to Bottom
00D2	0210	Graphics Bar Left to Right Double Center to Bottom
00D3	0211	Graphics Bar Right to Center Double Top to Center
00D4	0212	Graphics Bar Double Right to Center Top to Center
00D5	0213	Graphics Bar Double Right to Center Center to Bottom
00D6	0214	Graphics Bar Right to Center Double Center to Bottom
00D7	0215	Graphics Bar Left to Right Double Top to Bottom
00D8	0216	Graphics Bar Double Left to Right Top to Bottom
00D9	0217	Graphics Bar Left to Center Top to Center
00DA	0218	Graphics Bar Right to Center Center to Bottom
00DB	0219	Graphics Block Black
00DC	0220	Graphics Block Black Bottom Half
00DD	0221	Graphics Block Black Left Half
00DE	0222	Graphics Block Black Right Half
00DF	0223	Graphics Block Black Top Half
00E0	0224	Lowercase Alpha
00E1	0225	Lowercase Beta
00E2	0226	Uppercase Gamma
00E3	0227	Lowercase Pi
00E4	0228	Uppercase Sigma
00E5	0229	Lowercase Sigma
00E6	0230	Lowercase Mu
00E7	0231	Lowercase Tau
00E8	0232	Uppercase Phi
00E9	0233	Uppercase Theta
00EA	0234	Uppercase Omega
00EB	0235	Lowercase Delta
00EC	0236	Infinity
00ED	0237	Lowercase Phi Script
00EE	0238	Lowercase Epsilon
00EF	0239	Intersection Symbol
00F0	0240	Equivalent Symbol
00F1	0241	Plus or Minus Symbol
00F2	0242	Greater Than or Equal Symbol
00F3	0243	Less Than or Equal Symbol
00F4	0244	Integral Symbol Top Half
00F5	0245	Integral Symbol Bottom Half
00F6	0246	Divide Symbol
00F7	0247	Approximate Sign
00F8	0248	Degree Symbol

(continued)

Hex Value	Decimal Value	Symbol Name
00F9	0249	Big Dot
00FA	0250	Small Dot
00FB	0251	Radical Symbol
00FC	0252	Superscript Lowercase N
00FD	0253	Superscript 2
00FE	0254	Small Square
00FF	0255	Semicolon with Overline
0100	0256	Uppercase A with Circumflex
0101	0257	Uppercase E with Circumflex
0102	0258	Uppercase I with Circumflex
0103	0259	Uppercase O with Circumflex
0104	0260	Uppercase U with Circumflex
0105	0261	Lowercase A with Tilde
0106	0262	Lowercase O with Tilde
0107	0263	Uppercase A with Tilde
0108	0264	Uppercase O with Tilde
0109	0265	Fraction Three Quarters
010A	0266	Superscript 1
010B	0267	Superscript 3
010C	0268	Acute Accent Mark
010D	0269	Uppercase E with Umlaut
010E	0270	Copyright Symbol
010F	0271	Reserved Symbol
0110	0272	Uppercase IJ with Ligature
0111	0273	Lowercase IJ with Ligature
0112	0274	Uppercase Elif
0113	0275	Lowercase Elif
0114	0276	Uppercase G with Caron
0115	0277	Lowercase G with Caron
0116	0278	Uppercase S with Cedilla
0117	0279	Lowercase S with Cedilla
0118	0280	Uppercase I with Ring
01D4	0468	Uppercase OE with Ligature
01D5	0469	Lowercase OE with Ligature
01D6	0470	Asterisk with Overline
01D7	0471	Black Out Box
01D8	0472	Uppercase Y with Umlaut
01E3	0483	Fork
01E4	0484	Chair
01E5	0485	Hook
01E6	0486	Uppercase Underline
01E7	0487	Uppercase I Centered
01E8	0488	Uppercase I Right
01E9	0489	Uppercase I Right Underline

(continued)

Hex Value	Decimal Value	Symbol Name
01EA	0490	Lowercase O with Dot
01EB	0491	Up Arrow
01EC	0492	Down Arrow
01ED	0493	Right Arrow

Alphabetical Character Location Listing

The complete Character Library is listed below, arranged in alphabetical order by the symbol's technical name. Included are the hexadecimal and decimal values for each symbol.

Hex Value	Decimal Value	Symbol Name
010C	0268	Acute Accent Mark
0026	0038	Ampersand
00F7	0247	Approximate Sign
002A	0042	Asterisk
01D6	0470	Asterisk with Overline
0040	0064	At Sign
005C	0092	Back Slash
00A9	0169	Backward Not Sign
00F9	0249	Big Dot
0005	0005	Black Club
0004	0004	Black Diamond
0003	0003	Black Heart
01D7	0471	Black Out Box
0006	0006	Black Spade
007C	0124	Broken Vertical Bar
007F	0127	Caron
001C	0028	Cedilla
009B	0155	Cent Sign
01E4	0484	Chair
005E	0094	Circumflex
003A	0058	Colon
002C	0044	Comma
010E	0270	Copyright Symbol
00F8	0248	Degree Symbol
00F6	0246	Divide Symbol
0024	0036	Dollar Sign
0022	0034	Double Quote
001D	0029	Double Underline
01EC	0492	Down Arrow
0038	0056	Eight
003D	0061	Equals Sign
00F0	0240	Equivalent Symbol
0021	0033	Exclamation Mark
00A6	0166	Feminine Ordinal Indicator
0035	0053	Five
01E3	0483	Fork
0034	0052	Four
00AB	0171	Fraction One Half

(continued)

Hex Value	Decimal Value	Symbol Name
00AC	0172	Fraction One Quarter
0109	0265	Fraction Three Quarters
009F	0159	Franc Sign
00B8	0184	Graphics Bar Double Left to Center Center to Bottom
00BB	0187	Graphics Bar Double Left to Center Double Center to Bottom
00B9	0185	Graphics Bar Double Left to Center Double Top to Bottom
00BC	0188	Graphics Bar Double Left to Center Double Top to Center
00B5	0181	Graphics Bar Double Left to Center Top to Bottom
00BE	0190	Graphics Bar Double Left to Center Top to Center
00CD	0205	Graphics Bar Double Left to Right
00D1	0209	Graphics Bar Double Left to Right Center to Bottom
00CB	0203	Graphics Bar Double Left to Right Double Center to Bottom
00CE	0206	Graphics Bar Double Left to Right Double Top to Bottom
00CA	0202	Graphics Bar Double Left to Right Double Top to Center
00D8	0216	Graphics Bar Double Left to Right Top to Bottom
00CF	0207	Graphics Bar Double Left to Right Top to Center
00D5	0213	Graphics Bar Double Right to Center Center to Bottom
00C9	0201	Graphics Bar Double Right to Center Double Center to Bottom
00CC	0204	Graphics Bar Double Right to Center Double Top to Bottom
00C8	0200	Graphics Bar Double Right to Center Double Top to Center
00C6	0198	Graphics Bar Double Right to Center Top to Bottom
00D4	0212	Graphics Bar Double Right to Center Top to Center
00BA	0186	Graphics Bar Double Top to Bottom
00B7	0183	Graphics Bar Left to Center Double Center to Bottom
00B6	0182	Graphics Bar Left to Center Double Top to Bottom
00BD	0189	Graphics Bar Left to Center Double Top to Center
00BF	0191	Graphics Bar Left to Center Center to Bottom
00B4	0180	Graphics Bar Left to Center Top to Bottom
00D9	0217	Graphics Bar Left to Center Top to Center
00C4	0196	Graphics Bar Left to Right
00C2	0194	Graphics Bar Left to Right Center to Bottom
00D2	0210	Graphics Bar Left to Right Double Center to Bottom
00D7	0215	Graphics Bar Left to Right Double Top to Bottom
00D0	0208	Graphics Bar Left to Right Double Top to Center
00C5	0197	Graphics Bar Left to Right Top to Bottom

(continued)

Hex Value	Decimal Value	Symbol Name
00C1	0193	Graphics Bar Left to Right Top to Center
00DA	0218	Graphics Bar Right to Center Center to Bottom
00D6	0214	Graphics Bar Right to Center Double Center to Bottom
00C7	0199	Graphics Bar Right to Center Double Top to Bottom
00D3	0211	Graphics Bar Right to Center Double Top to Center
00C3	0195	Graphics Bar Right to Center Top to Bottom
00C0	0192	Graphics Bar Right to Center Top to Center
00B3	0179	Graphics Bar Top to Bottom
00DB	0219	Graphics Block Black
00DC	0220	Graphics Block Black Bottom Half
00DD	0221	Graphics Block Black Left Half
00DE	0222	Graphics Block Black Right Half
00DF	0223	Graphics Block Black Top Half
0060	0096	Grave Accent Mark
00B0	0176	Gray, 25% Density
00B1	0177	Gray, 50% Density
00B2	0178	Gray, 75% Density
00F2	0242	Greater Than or Equal Symbol
003E	0062	Greater Than Symbol
01E5	0485	Hook
00EC	0236	Infinity
00F4	0244	Integral Symbol Top Half
00F5	0245	Integral Symbol Bottom Half
0018	0024	International Currency Symbol
00EF	0239	Intersection Symbol
00AD	0173	Inverted Exclamation Mark
00A8	0168	Inverted Question Mark
00AE	0174	Left Angle Quote
007B	0123	Left Brace
005B	0091	Left Bracket
0028	0040	Left Parenthesis
00F3	0243	Less Than or Equal Symbol
003C	0060	Less Than Symbol
0061	0097	Lowercase A
00A0	0160	Lowercase A with Acute Accent Mark
0083	0131	Lowercase A with Circumflex
0085	0133	Lowercase A with Grave Accent Mark
0086	0134	Lowercase A with Ring
0105	0261	Lowercase A with Tilde
0084	0132	Lowercase A with Umlaut
0091	0145	Lowercase AE with Ligature
00E0	0224	Lowercase Alpha
0062	0098	Lowercase B

(continued)

Hex Value	Decimal Value	Symbol Name
00E1	0225	Lowercase Beta
0063	0099	Lowercase C
0087	0135	Lowercase C with Cedilla
0088	0136	Lowercase E with Circumflex
0064	0100	Lowercase D
00EB	0235	Lowercase Delta
0065	0101	Lowercase E
0082	0130	Lowercase E with Acute Accent Mark
0088	0136	Lowercase E with Circumflex
008A	0138	Lowercase E with Grave
0089	0137	Lowercase E with Umlaut
0113	0275	Lowercase Elif
00EE	0238	Lowercase Epsilon
001A	0026	Lowercase Eth
0066	0102	Lowercase F
0067	0103	Lowercase G
0115	0277	Lowercase G with Caron
0068	0104	Lowercase H
0069	0105	Lowercase I
00A1	0161	Lowercase I with Acute Accent Mark
008C	0140	Lowercase I with Circumflex
008D	0141	Lowercase I with Grave Accent Mark
008B	0139	Lowercase I with Umlaut
0111	0273	Lowercase IJ with Ligature
006A	0106	Lowercase J
006B	0107	Lowercase K
006C	0108	Lowercase L
006D	0109	Lowercase M
00E6	0230	Lowercase Mu
006E	0110	Lowercase N
00A4	0164	Lowercase N with Tilde
006F	0111	Lowercase O/Omicron
00A2	0162	Lowercase O with Acute Accent Mark
0093	0147	Lowercase O with Circumflex
01EA	0490	Lowercase O with Dot
0095	0149	Lowercase O with Grave Accent Mark
0106	0262	Lowercase O with Tilde
0094	0148	Lowercase O with Umlaut
001F	0031	Lowercase O with Slash
01D5	0469	Lowercase OE with Ligature
0070	0112	Lowercase P
00ED	0237	Lowercase Phi Script
00E3	0227	Lowercase Pi

(continued)

Hex Value	Decimal Value	Symbol Name
0071	0113	Lowercase Q
0072	0114	Lowercase R
0073	0115	Lowercase S
0117	0279	Lowercase S with Cedilla
00E5	0229	Lowercase Sigma
0074	0116	Lowercase T
00E7	0231	Lowercase Tau
0002	0002	Lowercase Thorn
0075	0117	Lowercase U
00A3	0163	Lowercase U with Acute Accent Mark
0096	0150	Lowercase U with Circumflex
0097	0151	Lowercase U with Grave
0081	0129	Lowercase U with Umlaut
0076	0118	Lowercase V
0077	0119	Lowercase W
0078	0120	Lowercase X
0079	0121	Lowercase Y
000E	0014	Lowercase Y with Acute Accent Mark
0098	0152	Lowercase Y with Umlaut
007A	0122	Lowercase Z
00A7	0167	Masculine Ordinal Indicator
002D	0045	Minus Sign
001E	0030	Multiplication Sign
0039	0057	Nine
00AA	0170	Not Sign
0023	0035	Number Sign
0031	0049	One
0000	0000	Overline
0014	0020	Paragraph Sign
0025	0037	Percent Sign
002E	0046	Period
009E	0158	Peseta Sign
00F1	0241	Plus or Minus Symbol
002B	0043	Plus Sign
009C	0156	Pound Sign
003F	0063	Question Mark
00FB	0251	Radical Symbol
010F	0271	Reserved Symbol
00AF	0175	Right Angle Quote
01ED	0493	Right Arrow
007D	0125	Right Brace
005D	0093	Right Bracket
0029	0041	Right Parenthesis

(continued)

Hex Value	Decimal Value	Symbol Name
0015	0021	Section Sign
003B	0059	Semicolon
00FF	0255	Semicolon with Overline
0037	0055	Seven
0027	0039	Single Quote
0036	0054	Six
002F	0047	Slash
00FA	0250	Small Dot
00FE	0254	Small Square
001B	0027	Solid Vertical Bar
0020	0032	Space
00FC	0252	Superscript Lowercase N
010A	0266	Superscript 1
00FD	0253	Superscript 2
010B	0267	Superscript 3
0033	0051	Three
007E	0126	Tilde
0032	0050	Two
0007	0007	Umlaut
005F	0095	Underline
01EB	0491	Up Arrow
0041	0065	Uppercase A/Alpha
000A	0010	Uppercase A with Acute Accent Mark
0100	0256	Uppercase A with Circumflex
0011	0017	Uppercase A with Grave Accent Mark
008F	0143	Uppercase A with Ring
0107	0263	Uppercase A with Tilde
008E	0142	Uppercase A with Umlaut
0092	0146	Uppercase AE with Ligature
0042	0066	Uppercase B/Beta
0043	0067	Uppercase C
0080	0128	Uppercase C with Cedilla
0044	0068	Uppercase D
0045	0069	Uppercase E/Epsilon
0090	0144	Uppercase E with Acute Accent Mark
0101	0257	Uppercase E with Circumflex
0012	0018	Uppercase E with Grave Accent Mark
010D	0269	Uppercase E with Umlaut
0112	0274	Uppercase Elif
0009	0009	Uppercase Eth
0046	0070	Uppercase F
0047	0071	Uppercase G
0114	0276	Uppercase G with Caron

(continued)

Hex Value	Decimal Value	Symbol Name
00E2	0226	Uppercase Gamma
0048	0072	Uppercase H/Eta
0049	0073	Uppercase I/Iota
01E7	0487	Uppercase I Centered
01E8	0488	Uppercase I Right
01E9	0489	Uppercase I Right Underline
000B	0011	Uppercase I with Acute Accent Mark
0102	0258	Uppercase I with Circumflex
0013	0019	Uppercase I with Grave Accent Mark
0118	0280	Uppercase I with Ring
0001	0001	Uppercase I with Umlaut
0110	0272	Uppercase IJ with Ligature
004A	0074	Uppercase J
004B	0075	Uppercase K/Kappa
004C	0076	Uppercase L
004D	0077	Uppercase M/Mu
004E	0078	Uppercase N/Nu
00A5	0165	Uppercase N with Tilde
004F	0079	Uppercase O/Omicron
000C	0012	Uppercase O with Acute Accent Mark
0103	0259	Uppercase O with Circumflex
0016	0022	Uppercase O with Grave Accent Mark
0010	0016	Uppercase O with Slash
0108	0264	Uppercase O with Tilde
0099	0153	Uppercase O with Umlaut
01D4	0468	Uppercase OE with Ligature
00EA	0234	Uppercase Omega
0050	0080	Uppercase P/Rho
00E8	0232	Uppercase Phi
0051	0081	Uppercase Q
0052	0082	Uppercase R
0053	0083	Uppercase S
0116	0278	Uppercase S with Cedilla
00E4	0228	Uppercase Sigma
0054	0084	Uppercase T
00E9	0233	Uppercase Theta
0019	0025	Uppercase Thorn
0055	0085	Uppercase U
000D	0013	Uppercase U with Acute Accent Mark
0104	0260	Uppercase U with Circumflex
0017	0023	Uppercase U with Grave Accent Mark
009A	0154	Uppercase U with Umlaut
01E6	0486	Uppercase Underline

(continued)

Hex Value	Decimal Value	Symbol Name
0056	0086	Uppercase V
0057	0087	Uppercase W
0058	0088	Uppercase X/Chi
0059	0089	Uppercase Y/Upsilon
000F	0015	Uppercase Y with Acute Accent Mark
01D8	0472	Uppercase Y with Umlaut
005A	0090	Uppercase Z/Zeta
009D	0157	Yen Sign
0030	0048	Zero

CHAPTER 10

INSTALLATION

Introduction

This chapter explains the P3000 Series installation procedures. Read this chapter carefully before installing and operating the printer. Perform the procedures in the order presented. The following topics are discussed in this chapter:

Power Requirements

A label on the back of the printer near the power cord indicates the voltage and frequency requirements. The printer must be connected to the specified power source in the proper range, 92 to 132 VAC or 184 to 264 VAC, at 50 to 60 Hz. The printer automatically senses and adjusts itself to conform to the proper voltage range. Primary circuit protection is contained in the printer. Consult an electrician if printer operation affects local electrical lines.

❑ IMPORTANT ❑

Printronix **recommends that printer power be supplied from a separate circuit protected at 20 amps for 120 VAC, or 10 amps for 240 VAC at 50 or 60 Hz.**

❑ WICHTIG ❑

Es wird empfohlen, dass der Strom von einem separaten Wechselstromkreis dem Drucker zugeführt wird, der mit 20 A für 120 V oder 10 A für 240 V geschützt ist und 50 oder 60 Hz hat.

Site Requirements

When selecting the location for the printer, consider interface requirements, power requirements, and environmental factors. Select a location that has the proper power source available and is within the maximum cable length specifications for interfacing with the host computer.

The printer is designed to operate in a relatively dust free environment such as a computer room or business office with an ambient temperature of 5° to 40° C (41° to 104° F) and a relative humidity of 10 percent to 90 percent.

The site selected for the printer must also allow air to circulate freely all around the printer. Provide a minimum of three feet clearance behind the printer to allow air circulation and easy access to the paper stacking area. Figure 10–1 and Figure 10–2 illustrate the site requirements for the pedestal and floor cabinet models, respectively.

❑ CAUTION ❑

The warranty may be voided if adequate printer ventilation is not provided. Overheating and serious damage to printer components can occur if the air vents at rear of the printer are blocked.

❑ VORSICHT ❑

Die Gewährleistung könnte ungültig werden, wenn nicht genügend Drucker–Lüftung vorhanden ist. Überhitzung and schweren Schaden der Druckerkomponenten könnte vorkommen, wenn die Entlüftungsschlitze hinten am Drucker blockiert sind.

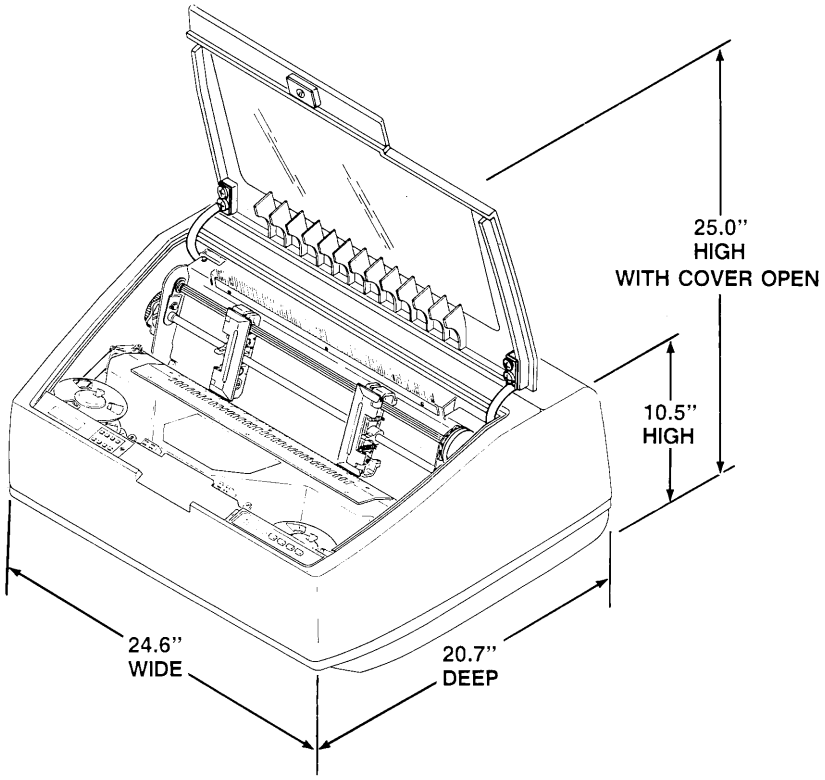


Figure 10–1. Pedestal Model Site Requirements

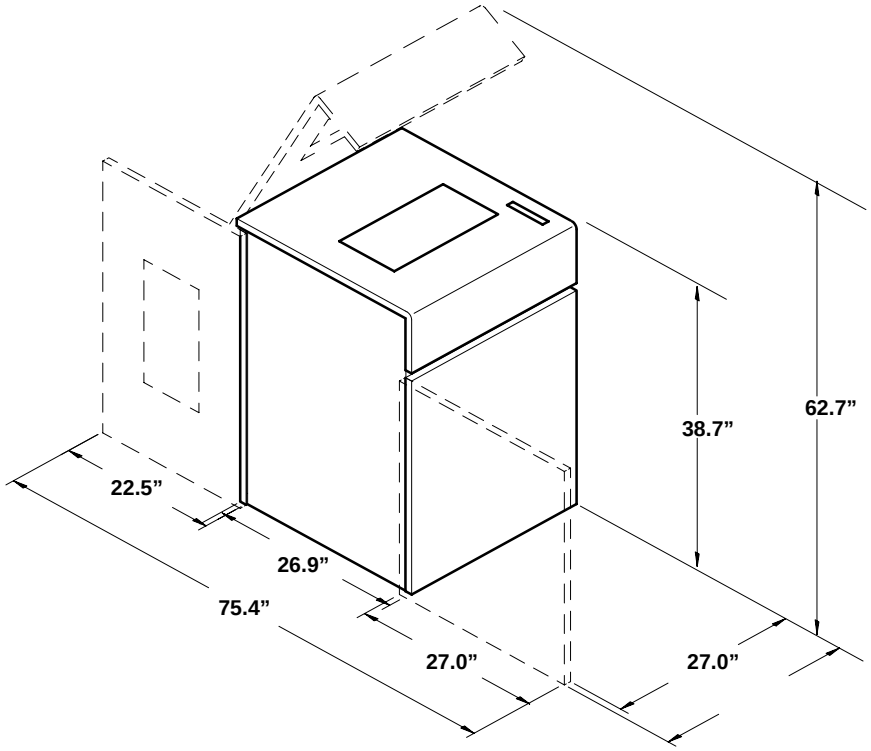


Figure 10–2. Floor Cabinet Model Site Requirements

Shipping Restraints

During shipping, the printer mechanism is protected by foam packing, restraint bolts, and a removable tie wrap securing the Forms Thickness Adjustment Lever. Remove the shipping restraints as described below and illustrated in Figure 10–3.

❑ CAUTION ❑

To avoid shipping damage, reinstall the shipping restraints whenever the printer is moved or shipped.

❑ VORSICHT ❑

Um Versandschäden zu verhindern, die Versand–Einspannungen wieder einbauen, wenn der Drucker versetzt oder versandt wird.

Shipping Restraint Removal

❑ WARNING ❑

To prevent possible injury, do not connect the AC power source before removing the shipping restraints. If the power source has already been connected, disconnect it before performing the shipping restraint removal procedures.

❑ WARNUNG ❑

Um mögliche Verletzungen zu vermeiden, darf die Netzverbindung erst nach dem Entfernen der Transportbefestigungen hergestellt werden. Falls die Netz verbindung bereits hergesfellt wurde, ist diese zu unterbrechen bevor die Transport befestigungen entfernt werden.

1. Raise the printer cover.
2. Loosen the captive screws (A) securing the shuttle cover (B).
3. Lift the shuttle cover (B) up and out of the slots at the front.
4. Remove the two red–capped transport restraint bolts (C) by hand. Place the bolts in the storage slot on the left side of the printer base (pedestal models; right side in floor cabinet models).

   NOTE: The restraining bolts must be reinstalled whenever the printer or shuttle assembly itself is shipped or transported.
5. Remove the tie wrap securing the Forms Thickness Adjustment Lever (D).
6. Lift the shuttle release lever (E), rotate the shuttle assembly upward (to its service position), and remove the foam pad (F). Lower the shuttle assembly back into print position.
7. Replace the shuttle cover (B) with the tabs sliding into the slots at the front. If you do not properly replace the cover, an error condition will show on the display when you try to operate the printer.
8. Retighten the captive screws (A) to secure the shuttle cover.

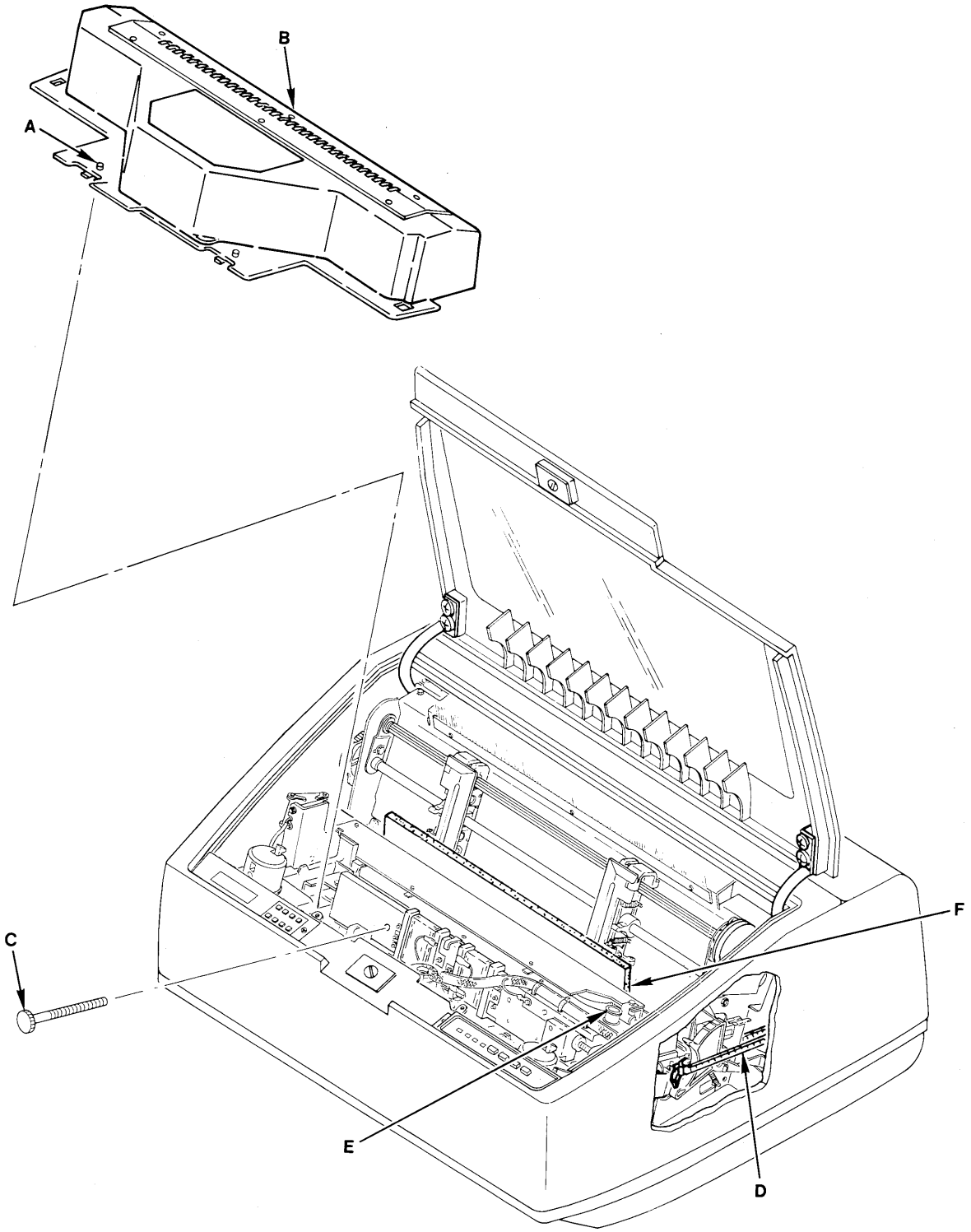


Figure 10–3. Shipping Restraint Removal

Cable Connections

Perform the following steps and refer to Figure 10–4 and Figure 10–5 to connect the cables to the pedestal model and floor cabinet model printers, respectively.

1. Verify that the voltage shown on the printer ID label (A) is within the same range as the site line voltage and that the proper power cord has been selected. Refer to the Power Requirements section on page 10–1.
2. Make sure the printer power switch (B) is set to OFF (0).
3. Connect the power cord between the printer's AC power connector (C) and the AC line receptacle.
4. Connect the interface cable (customer supplied) between the appropriate printer interface connector (D) and the host computer. Refer to the Interfaces chapter for a complete description of the printer interface.

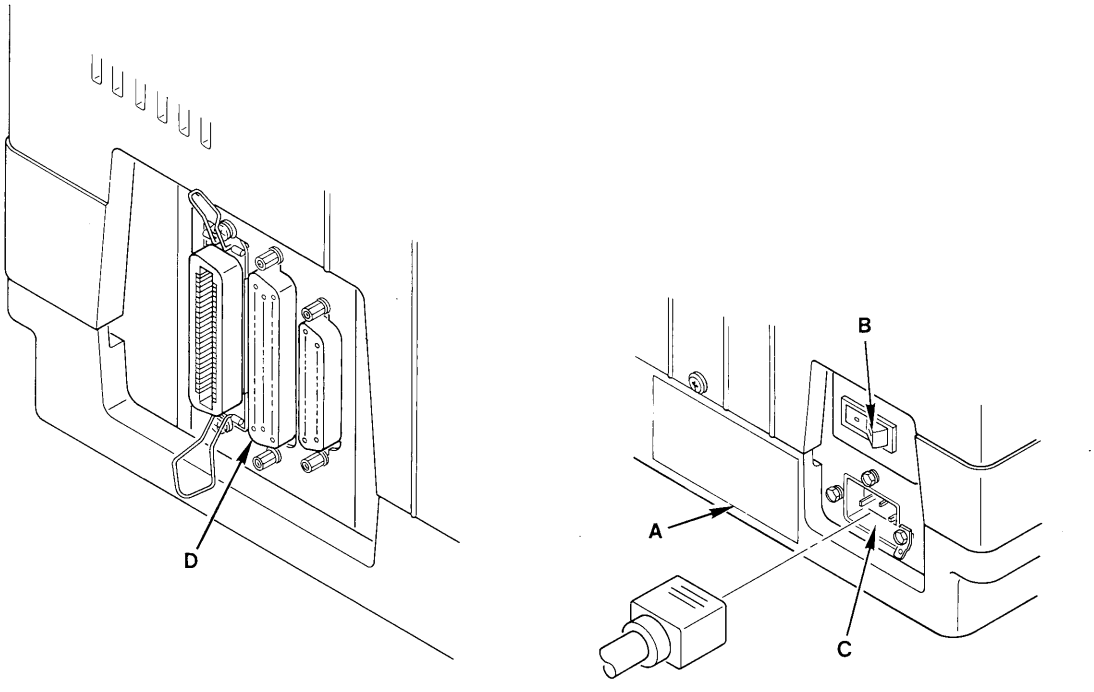


Figure 10–4. Cable Connections – Pedestal Models

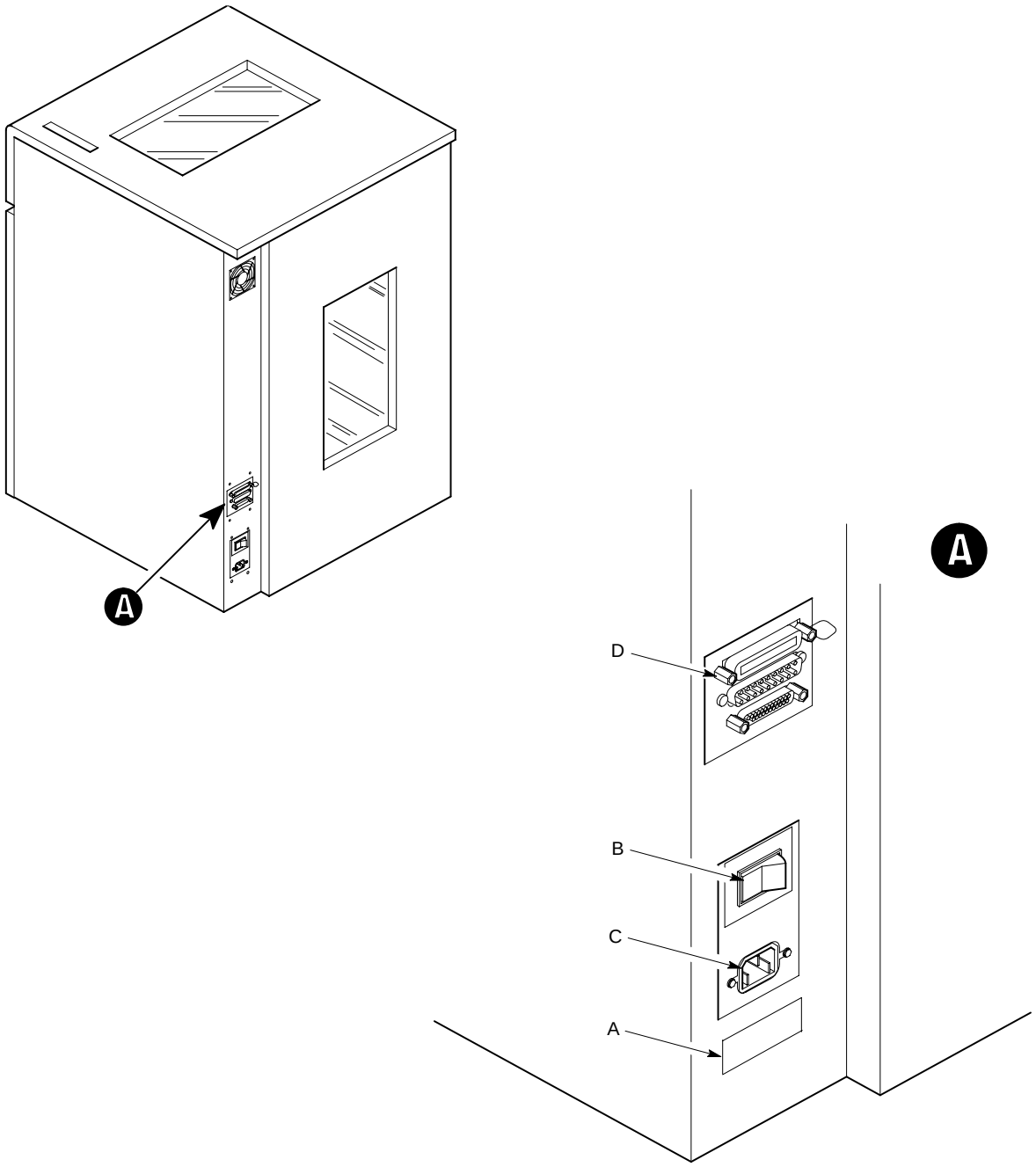


Figure 10–5. Cable Connections – Floor Cabinet Models

Preliminary Test

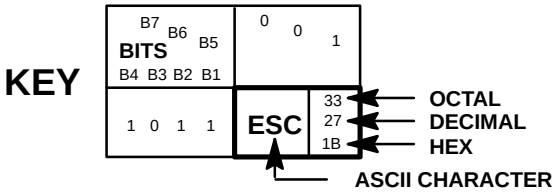
After installation, the printer is ready for preliminary testing. The following steps define the test procedure. Refer to the Operation chapter for a description of the control panel and message display.

1. Set the AC power switch to ON (|).
2. Load full–width (132 columns) computer paper and ribbon as described in the Loading Paper and Loading the Ribbon sections of the Operation chapter.
3. Set top–of–form as described in the Setting Top–of–Form section of the Operation chapter.
4. If the printer is on line, press the ON LINE switch until the display shows OFFLINE READY.
5. Press and hold the PAPER ADV switch. The paper advances to the next top–of–form.
6. Press the MENU DOWN switch, then repeatedly press the NEXT switch until the DIAGNOSTICS menu appears on the display.
7. Press the MENU DOWN switch, then repeatedly press the NEXT switch until the PRINTER TEST FULL WIDTH menu appears on the display.
8. Press the MENU DOWN switch, then repeatedly press the NEXT switch until the PRINTER TEST SHIFT RECYCLE message appears on the display.
9. Press the R/S switch. The RUNNING TEST SHIFT RECYCLE message appears. Shifted lines of the character set will print across the full width of the paper (132 characters).
10. To stop the test, press the R/S switch.
11. Press **C**LEAR to return the printer to OFFLINE READY.

Examine the print quality. The characters should be fully formed and of uniform density. If the test does not run or characters appear malformed, contact your authorized service representative.

APPENDIX A

STANDARD ASCII CHARACTER CHART



BITS B7 B6 B5 / B4 B3 B2 B1 / ROW	COLUMN 0 (0 0 0)		1 (0 0 1)		2 (0 1 0)		3 (0 1 1)		4 (1 0 0)		5 (1 0 1)		6 (1 1 0)		7 (1 1 1)	
0 0 0 0 / 0	NUL	0 0 0	DLE	20 16 10	SP	40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1 / 1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0 / 2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1 / 3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0 / 4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1 / 5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0 / 6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1 / 7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0 / 8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1 / 9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0 / 10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1 / 11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0 / 12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1 / 13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0 / 14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1 / 15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

APPENDIX B

CHARACTER SETS

Introduction

The character set charts in this appendix provide the hexadecimal character address matrices for each character set and international language. For example, if the IBM PC Character Set and U.S. American Standard Code for Information Interchange (ASCII) Language is selected, 0023 hex selects the number sign (#). If IBM PC–English language is selected, hex 0023 on the IBM–PC International Language Substitution Table will substitute the English pound symbol (£) for the number sign.

The International Language Substitution tables identify only specific character substitutions available in the selected language. Hex addresses not shown on the substitution tables use the character in the hex address shown on the standard character set matrix.

NOTE: The character examples provided in this appendix are representative examples and not exact replications generated by the printer. Not all characters are available in all print modes.

IBM PC Character Set Charts

IBM PC Primary Character Set
P–Series Emulation (80–9F=Control Codes)

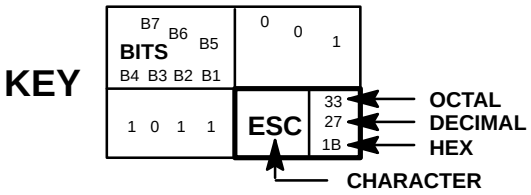
See the IBM–PC International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0			0 0 1			0 1 0			0 1 1			1 0 0			1 0 1			1 1 0			1 1 1		
		COLUMN 0			1			2			3			4			5			6			7		
0 0 0 0	0	NUL	0 0 0		DLE	20 16 10			40 32 20		0	60 48 30		@	100 64 40		P	120 80 50		`	140 96 60		p	160 112 70	
0 0 0 1	1	SOH	1 1 1		DC1 (XON)	21 17 11		!	41 33 21		1	61 49 31		A	101 65 41		Q	121 81 51		a	141 97 61		q	161 113 71	
0 0 1 0	2	STX	2 2 2		DC2	22 18 12		"	42 34 22		2	62 50 32		B	102 66 42		R	122 82 52		b	142 98 62		r	162 114 72	
0 0 1 1	3	ETX	3 3 3		DC3 (XOFF)	23 19 13		#	43 35 23		3	63 51 33		C	103 67 43		S	123 83 53		c	143 99 63		s	163 115 73	
0 1 0 0	4	EOT	4 4 4		DC4	24 20 14		$	44 36 24		4	64 52 34		D	104 68 44		T	124 84 54		d	144 100 64		t	164 116 74	
0 1 0 1	5	ENQ	5 5 5		NAK	25 21 15		%	45 37 25		5	65 53 35		E	105 69 45		U	125 85 55		e	145 101 65		u	165 117 75	
0 1 1 0	6	ACK	6 6 6		SYN	26 22 16		&	46 38 26		6	66 54 36		F	106 70 46		V	126 86 56		f	146 102 66		v	166 118 76	
0 1 1 1	7	BEL	7 7 7		ETB	27 23 17		´	47 39 27		7	67 55 37		G	107 71 47		W	127 87 57		g	147 103 67		w	167 119 77	
1 0 0 0	8	BS	10 8 8		CAN	30 24 18		(	50 40 28		8	70 56 38		H	110 72 48		X	130 88 58		h	150 104 68		x	170 120 78	
1 0 0 1	9	HT	11 9 9		EM	31 25 19		)	51 41 29		9	71 57 39		I	111 73 49		Y	131 89 59		i	151 105 69		y	171 121 79	
1 0 1 0	10	LF	12 10 0 A		SUB	32 26 1A		*	52 42 2A		:	72 58 3A		J	112 74 4A		Z	132 90 5A		j	152 106 6A		z	172 122 7A	
1 0 1 1	11	VT	13 11 0 B		ESC	33 27 1B		+	53 43 2B		;	73 59 3B		K	113 75 4B		[	133 91 5B		k	153 107 6B		{	173 123 7B	
1 1 0 0	12	FF	14 12 0 C		FS	34 28 1C		,	54 44 2C		<	74 60 3C		L	114 76 4C		\	134 92 5C		l	154 108 6C		¦	174 124 7C	
1 1 0 1	13	CR	15 13 0 D		GS	35 29 1D		–	55 45 2D		=	75 61 3D		M	115 77 4D		]	135 93 5D		m	155 109 6D		}	175 125 7D	
1 1 1 0	14	SO	16 14 0 E		RS	36 30 1E		.	56 46 2E		>	76 62 3E		N	116 78 4E		^	136 94 5E		n	156 110 6E		~	176 126 7E	
1 1 1 1	15	SI	17 15 0 F		US	37 31 1F		/	57 47 2F		?	77 63 3F		O	117 79 4F		_	137 95 5F		o	157 111 6F			177 127 7F	

IBM PC Extended Set
P–Series Emulation (80–9F=Control Codes)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90	á	240 160 A0	▒	260 176 B0	└	300 192 C0	╨	320 208 D0	α	340 224 E0	≡	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	í	241 161 A1	▓	261 177 B1	┴	301 193 C1	╤	321 209 D1	β	341 225 E1	±	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	ó	242 162 A2	▓	262 178 B2	┬	302 194 C2	╥	322 210 D2	Γ	342 226 E2	≥	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	ú	243 163 A3	│	263 179 B3	├	303 195 C3	╙	323 211 D3	π	343 227 E3	≤	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	ñ	244 164 A4	┤	264 180 B4	─	304 196 C4	╘	324 212 D4	Σ	344 228 E4	⌠	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	Ñ	245 165 A5	╡	265 181 B5	┼	305 197 C5	╒	325 213 D5	σ	345 229 E5	⌡	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	ª	246 166 A6	╢	266 182 B6	╞	306 198 C6	╓	326 214 D6	µ	346 230 E6	÷	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	º	247 167 A7	╖	267 183 B7	╟	307 199 C7	╫	327 215 D7	τ	347 231 E7	≈	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¿	250 168 A8	╕	270 184 B8	╚	310 200 C8	╪	330 216 D8	Φ	350 232 E8	°	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	⌐	251 169 A9	╣	271 185 B9	╔	311 201 C9	┘	331 217 D9	Θ	351 233 E9	•	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	¬	252 170 AA	║	272 186 BA	╩	312 202 CA	┌	332 218 DA	Ω	352 234 EA	·	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	1/2	253 171 AB	╗	273 187 BB	╦	313 203 CB	▉	333 219 DB	δ	353 235 EB	√	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	1/4	254 172 AC	╝	274 188 BC	╠	314 204 CC	▄	334 220 DC	∞	354 236 EC	n	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	¡	255 173 AD	╜	275 189 BD	═	315 205 CD	▊	335 221 DD	ϕ	355 237 ED	2	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	<<	256 174 AE	╛	276 190 BE	╬	316 206 CE	▊	336 222 DE	∈	356 238 EE	▪	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	>>	257 175 AF	┐	277 191 BF	╧	317 207 CF	▄	337 223 DF	∩	357 239 EF		377 255 FF

IBM PC Primary Character Set
P–Series Emulation (80–9F=Printable Symbols)

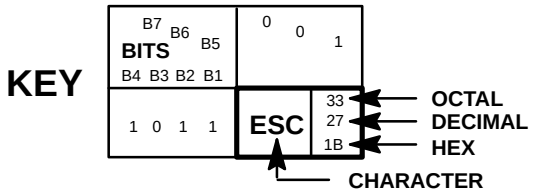
See the IBM–PC International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	COLUMN 0			1			2			3			4			5			6			7		
0 0 0 0	0	NUL	0 0 0		DLE	20 16 10			40 32 20		0	60 48 30		@	100 64 40		P	120 80 50		`	140 96 60		p	160 112 70	
0 0 0 1	1	SOH	1 1 1		DC1 (XON)	21 17 11		!	41 33 21		1	61 49 31		A	101 65 41		Q	121 81 51		a	141 97 61		q	161 113 71	
0 0 1 0	2	STX	2 2 2		DC2	22 18 12		"	42 34 22		2	62 50 32		B	102 66 42		R	122 82 52		b	142 98 62		r	162 114 72	
0 0 1 1	3	ETX	3 3 3		DC3 (XOFF)	23 19 13		#	43 35 23		3	63 51 33		C	103 67 43		S	123 83 53		c	143 99 63		s	163 115 73	
0 1 0 0	4	EOT	4 4 4		DC4	24 20 14		$	44 36 24		4	64 52 34		D	104 68 44		T	124 84 54		d	144 100 64		t	164 116 74	
0 1 0 1	5	ENQ	5 5 5		NAK	25 21 15		%	45 37 25		5	65 53 35		E	105 69 45		U	125 85 55		e	145 101 65		u	165 117 75	
0 1 1 0	6	ACK	6 6 6		SYN	26 22 16		&	46 38 26		6	66 54 36		F	106 70 46		V	126 86 56		f	146 102 66		v	166 118 76	
0 1 1 1	7	BEL	7 7 7		ETB	27 23 17		'	47 39 27		7	67 55 37		G	107 71 47		W	127 87 57		g	147 103 67		w	167 119 77	
1 0 0 0	8	BS	10 8 8		CAN	30 24 18		(	50 40 28		8	70 56 38		H	110 72 48		X	130 88 58		h	150 104 68		x	170 120 78	
1 0 0 1	9	HT	11 9 9		EM	31 25 19		)	51 41 29		9	71 57 39		I	111 73 49		Y	131 89 59		i	151 105 69		y	171 121 79	
1 0 1 0	10	LF	12 10 0 A		SUB	32 26 1A		*	52 42 2A		:	72 58 3A		J	112 74 4A		Z	132 90 5A		j	152 106 6A		z	172 122 7A	
1 0 1 1	11	VT	13 11 0 B		ESC	33 27 1B		+	53 43 2B		;	73 59 3B		K	113 75 4B		[	133 91 5B		k	153 107 6B		{	173 123 7B	
1 1 0 0	12	FF	14 12 0 C		FS	34 28 1C		,	54 44 2C		<	74 60 3C		L	114 76 4C		\	134 92 5C		l	154 108 6C		¦	174 124 7C	
1 1 0 1	13	CR	15 13 0 D		GS	35 29 1D		–	55 45 2D		=	75 61 3D		M	115 77 4D		]	135 93 5D		m	155 109 6D		}	175 125 7D	
1 1 1 0	14	SO	16 14 0 E		RS	36 30 1E		.	56 46 2E		>	76 62 3E		N	116 78 4E		^	136 94 5E		n	156 110 6E		~	176 126 7E	
1 1 1 1	15	SI	17 15 0 F		US	37 31 1F		/	57 47 2F		?	77 63 3F		O	117 79 4F		_	137 95 5F		o	157 111 6F			177 127 7F	

IBM PC Extended Set
P–Series Emulation (80–9F=Printable Symbols)



* IF ENABLED

B8*		1															
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	Ç	200 128 80	É	220 144 90	á	240 160 A0	▒	260 176 B0	└	300 192 C0	╨	320 208 D0	α	340 224 E0	≡	360 240 F0
0 0 0 1	1	ü	201 129 81	æ	221 145 91	í	241 161 A1	▓	261 177 B1	┴	301 193 C1	╤	321 209 D1	β	341 225 E1	±	361 241 F1
0 0 1 0	2	é	202 130 82	Æ	222 146 92	ó	242 162 A2	▓	262 178 B2	┬	302 194 C2	╥	322 210 D2	Γ	342 226 E2	≥	362 242 F2
0 0 1 1	3	â	203 131 83	ô	223 147 93	ú	243 163 A3	|	263 179 B3	├	303 195 C3	╙	323 211 D3	π	343 227 E3	≤	363 243 F3
0 1 0 0	4	ä	204 132 84	ö	224 148 94	ñ	244 164 A4	┤	264 180 B4	─	304 196 C4	╘	324 212 D4	Σ	344 228 E4	⌠	364 244 F4
0 1 0 1	5	à	205 133 85	ò	225 149 95	Ñ	245 165 A5	╡	265 181 B5	┼	305 197 C5	╒	325 213 D5	σ	345 229 E5	⌡	365 245 F5
0 1 1 0	6	å	206 134 86	û	226 150 96	ª	246 166 A6	╢	266 182 B6	╞	306 198 C6	╓	326 214 D6	µ	346 230 E6	÷	366 246 F6
0 1 1 1	7	ç	207 135 87	ù	227 151 97	º	247 167 A7	╖	267 183 B7	╟	307 199 C7	╫	327 215 D7	τ	347 231 E7	≈	367 247 F7
1 0 0 0	8	ê	210 136 88	ÿ	230 152 98	¿	250 168 A8	╕	270 184 B8	╚	310 200 C8	╪	330 216 D8	Φ	350 232 E8	°	370 248 F8
1 0 0 1	9	ë	211 137 89	Ö	231 153 99	⌐	251 169 A9	╣	271 185 B9	╔	311 201 C9	┘	331 217 D9	Θ	351 233 E9	•	371 249 F9
1 0 1 0	10	è	212 138 8A	Ü	232 154 9A	¬	252 170 AA	║	272 186 BA	╩	312 202 CA	┌	332 218 DA	Ω	352 234 EA	·	372 250 FA
1 0 1 1	11	ï	213 139 8B	¢	233 155 9B	1/2	253 171 AB	╗	273 187 BB	╦	313 203 CB	▉	333 219 DB	δ	353 235 EB	√	373 251 FB
1 1 0 0	12	î	214 140 8C	£	234 156 9C	1/4	254 172 AC	╝	274 188 BC	╠	314 204 CC	▄	334 220 DC	∞	354 236 EC	n	374 252 FC
1 1 0 1	13	ì	215 141 8D	¥	235 157 9D	¡	255 173 AD	╜	275 189 BD	═	315 205 CD	▌	335 221 DD	ϕ	355 237 ED	2	375 253 FD
1 1 1 0	14	Ä	216 142 8E	₧	236 158 9E	«	256 174 AE	╛	276 190 BE	╬	316 206 CE	▐	336 222 DE	∈	356 238 EE	▪	376 254 FE
1 1 1 1	15	Å	217 143 8F	ƒ	237 159 9F	»	257 175 AF	┐	277 191 BF	╧	317 207 CF	▀	337 223 DF	∩	357 239 EF		377 255 FF

IBM PC Primary Character Set
Serial Matrix Emulation (80–9F=Control Codes)

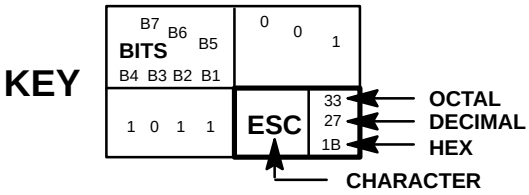
See the IBM–PC International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0			0 0 1			0 1 0			0 1 1			1 0 0			1 0 1			1 1 0			1 1 1		
		COLUMN 0			1			2			3			4			5			6			7		
0 0 0 0	0	NUL	0 0 0		DLE	20 16 10			40 32 20		0	60 48 30		@	100 64 40		P	120 80 50		`	140 96 60		p	160 112 70	
0 0 0 1	1	SOH	1 1 1		DC1 (XON)	21 17 11		!	41 33 21		1	61 49 31		A	101 65 41		Q	121 81 51		a	141 97 61		q	161 113 71	
0 0 1 0	2	STX	2 2 2		DC2	22 18 12		"	42 34 22		2	62 50 32		B	102 66 42		R	122 82 52		b	142 98 62		r	162 114 72	
0 0 1 1	3	ETX	3 3 3		DC3 (XOFF)	23 19 13		#	43 35 23		3	63 51 33		C	103 67 43		S	123 83 53		c	143 99 63		s	163 115 73	
0 1 0 0	4	EOT	4 4 4		DC4	24 20 14		$	44 36 24		4	64 52 34		D	104 68 44		T	124 84 54		d	144 100 64		t	164 116 74	
0 1 0 1	5	ENQ	5 5 5		NAK	25 21 15		%	45 37 25		5	65 53 35		E	105 69 45		U	125 85 55		e	145 101 65		u	165 117 75	
0 1 1 0	6	ACK	6 6 6		SYN	26 22 16		&	46 38 26		6	66 54 36		F	106 70 46		V	126 86 56		f	146 102 66		v	166 118 76	
0 1 1 1	7	BEL	7 7 7		ETB	27 23 17		´	47 39 27		7	67 55 37		G	107 71 47		W	127 87 57		g	147 103 67		w	167 119 77	
1 0 0 0	8	BS	10 8 8		CAN	30 24 18		(	50 40 28		8	70 56 38		H	110 72 48		X	130 88 58		h	150 104 68		x	170 120 78	
1 0 0 1	9	HT	11 9 9		EM	31 25 19		)	51 41 29		9	71 57 39		I	111 73 49		Y	131 89 59		i	151 105 69		y	171 121 79	
1 0 1 0	10	LF	12 10 0 A		SUB	32 26 1A		*	52 42 2A		:	72 58 3A		J	112 74 4A		Z	132 90 5A		j	152 106 6A		z	172 122 7A	
1 0 1 1	11	VT	13 11 0 B		ESC	33 27 1B		+	53 43 2B		;	73 59 3B		K	113 75 4B		[	133 91 5B		k	153 107 6B		{	173 123 7B	
1 1 0 0	12	FF	14 12 0 C		FS	34 28 1C		,	54 44 2C		<	74 60 3C		L	114 76 4C		\	134 92 5C		l	154 108 6C		¦	174 124 7C	
1 1 0 1	13	CR	15 13 0 D		GS	35 29 1D		–	55 45 2D		=	75 61 3D		M	115 77 4D		]	135 93 5D		m	155 109 6D		}	175 125 7D	
1 1 1 0	14	SO	16 14 0 E		RS	36 30 1E		.	56 46 2E		>	76 62 3E		N	116 78 4E		^	136 94 5E		n	156 110 6E		~	176 126 7E	
1 1 1 1	15	SI	17 15 0 F		US	37 31 1F		/	57 47 2F		?	77 63 3F		O	117 79 4F		_	137 95 5F		o	157 111 6F		DEL	177 127 7F	

IBM PC Extended Set
Serial Matrix Emulation (80–9F=Control Codes)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 8		0 0 1 / 9		0 1 0 / 10		0 1 1 / 11		1 0 0 / 12		1 0 1 / 13		1 1 0 / 14		1 1 1 / 15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90	á	240 160 A0	▒	260 176 B0	└	300 192 C0	╨	320 208 D0	α	340 224 E0	≡	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	í	241 161 A1	▓	261 177 B1	┴	301 193 C1	╤	321 209 D1	β	341 225 E1	±	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	ó	242 162 A2	■	262 178 B2	┬	302 194 C2	╥	322 210 D2	Γ	342 226 E2	≥	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	ú	243 163 A3	│	263 179 B3	├	303 195 C3	╙	323 211 D3	π	343 227 E3	≤	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	ñ	244 164 A4	┤	264 180 B4	─	304 196 C4	╘	324 212 D4	Σ	344 228 E4	⌠	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	Ñ	245 165 A5	╡	265 181 B5	┼	305 197 C5	╒	325 213 D5	σ	345 229 E5	⌡	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	a	246 166 A6	╢	266 182 B6	╞	306 198 C6	╓	326 214 D6	µ	346 230 E6	÷	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	o	247 167 A7	╖	267 183 B7	╟	307 199 C7	╫	327 215 D7	τ	347 231 E7	≈	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¿	250 168 A8	╕	270 184 B8	╚	310 200 C8	╪	330 216 D8	Φ	350 232 E8	°	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	⌐	251 169 A9	╣	271 185 B9	╔	311 201 C9	┘	331 217 D9	Θ	351 233 E9	•	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	¬	252 170 AA	║	272 186 BA	╩	312 202 CA	┌	332 218 DA	Ω	352 234 EA	·	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	1/2	253 171 AB	╗	273 187 BB	╦	313 203 CB	▉	333 219 DB	δ	353 235 EB	√	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	1/4	254 172 AC	╝	274 188 BC	╠	314 204 CC	▄	334 220 DC	∞	354 236 EC	n	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	¡	255 173 AD	╜	275 189 BD	═	315 205 CD	▌	335 221 DD	ϕ	355 237 ED	2	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	<<	256 174 AE	╛	276 190 BE	╬	316 206 CE	▐	336 222 DE	∈	356 238 EE	▪	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	>>	257 175 AF	┐	277 191 BF	╧	317 207 CF	▀	337 223 DF	∩	357 239 EF		377 255 FF

IBM PC Primary Character Set
Serial Matrix Emulation (80–9F=Printable Symbols)

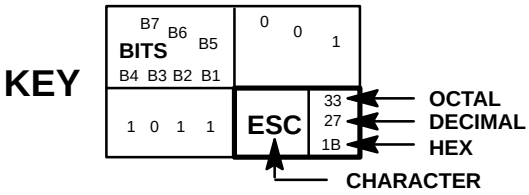
See the IBM–PC International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 0		0 0 1 / 1		0 1 0 / 2		0 1 1 / 3		1 0 0 / 4		1 0 1 / 5		1 1 0 / 6		1 1 1 / 7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	♥	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	♦	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	♣	5 5 5	§	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	♠	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	´	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	−	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

IBM PC Extended Set
Serial Matrix Emulation (80–9F=Printable Symbols)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	Ç	200 128 80	É	220 144 90	á	240 160 A0	▒	260 176 B0	└	300 192 C0	╨	320 208 D0	α	340 224 E0	≡	360 240 F0
0 0 0 1	1	ü	201 129 81	æ	221 145 91	í	241 161 A1	▓	261 177 B1	┴	301 193 C1	╤	321 209 D1	β	341 225 E1	±	361 241 F1
0 0 1 0	2	é	202 130 82	Æ	222 146 92	ó	242 162 A2	▓	262 178 B2	┬	302 194 C2	╥	322 210 D2	Γ	342 226 E2	≥	362 242 F2
0 0 1 1	3	â	203 131 83	ô	223 147 93	ú	243 163 A3	│	263 179 B3	├	303 195 C3	╙	323 211 D3	π	343 227 E3	≤	363 243 F3
0 1 0 0	4	ä	204 132 84	ö	224 148 94	ñ	244 164 A4	┤	264 180 B4	─	304 196 C4	╘	324 212 D4	Σ	344 228 E4	⌠	364 244 F4
0 1 0 1	5	à	205 133 85	ò	225 149 95	Ñ	245 165 A5	╡	265 181 B5	┼	305 197 C5	╒	325 213 D5	σ	345 229 E5	⌡	365 245 F5
0 1 1 0	6	å	206 134 86	û	226 150 96	ª	246 166 A6	╢	266 182 B6	╞	306 198 C6	╓	326 214 D6	µ	346 230 E6	÷	366 246 F6
0 1 1 1	7	ç	207 135 87	ù	227 151 97	º	247 167 A7	╖	267 183 B7	╟	307 199 C7	╫	327 215 D7	τ	347 231 E7	≈	367 247 F7
1 0 0 0	8	ê	210 136 88	ÿ	230 152 98	¿	250 168 A8	╕	270 184 B8	╚	310 200 C8	╪	330 216 D8	Φ	350 232 E8	°	370 248 F8
1 0 0 1	9	ë	211 137 89	Ö	231 153 99	⌐	251 169 A9	╣	271 185 B9	╔	311 201 C9	┘	331 217 D9	Θ	351 233 E9	•	371 249 F9
1 0 1 0	10	è	212 138 8A	Ü	232 154 9A	¬	252 170 AA	║	272 186 BA	╩	312 202 CA	┌	332 218 DA	Ω	352 234 EA	·	372 250 FA
1 0 1 1	11	ï	213 139 8B	¢	233 155 9B	1/2	253 171 AB	╗	273 187 BB	╦	313 203 CB	■	333 219 DB	δ	353 235 EB	√	373 251 FB
1 1 0 0	12	î	214 140 8C	£	234 156 9C	1/4	254 172 AC	╝	274 188 BC	╠	314 204 CC	▬	334 220 DC	∞	354 236 EC	n	374 252 FC
1 1 0 1	13	ì	215 141 8D	¥	235 157 9D	¡	255 173 AD	╜	275 189 BD	═	315 205 CD	▮	335 221 DD	ϕ	355 237 ED	2	375 253 FD
1 1 1 0	14	Ä	216 142 8E	₧	236 158 9E	«	256 174 AE	╛	276 190 BE	╬	316 206 CE	▮	336 222 DE	∈	356 238 EE	▪	376 254 FE
1 1 1 1	15	Å	217 143 8F	ƒ	237 159 9F	»	257 175 AF	┐	277 191 BF	╧	317 207 CF	▬	337 223 DF	∩	357 239 EF		377 255 FF

IBM PC International Languages Substitution Table

	Hex Address												
LANGUAGE	**0023**	**0024**	**0040**	**005B**	**005C**	**005D**	**005E**	**005F**	**0060**	**007B**	**007C**	**007D**	**007E**
ASCII	#	$	@	[	\	]	^	_	`	{	¦	}	~
French	#	$	à	°	ç	§	^	_	`	é	ù	è	¨
German	#	$	§	Ä	Ö	Ü	^	_	`	ä	ö	ü	β
English	£	$	@	[	\	]	^	_	`	{	¦	}	~
Danish	#	$	@	Æ	Ø	Å	^	_	`	æ	ø	å	~
Swedish	#	¤	É	Ä	Ö	Å	Ü	_	é	ä	ö	å	ü
Italian	#	$	@	°	\	é	^	_	ù	à	ò	è	ì
Spanish	₧	$	@	¡	Ñ	¿	^	_	`	¨	ñ	}	~
Japanese	#	$	@	[	¥	]	^	_	`	{	¦	}	~
French Canadian	#	$	à	â	ç	ê	î	_	ô	é	ù	è	û
Latin American	#	$	@	[	Ñ	]	ú	ñ	í	ó	á	é	ü

Example: *005B = [in ASCII*
005B = Æ in Danish

Multinational Character Set Charts

NOTE: The OCR charts indicate appropriate character codes only and do not represent the actual character style and shape.

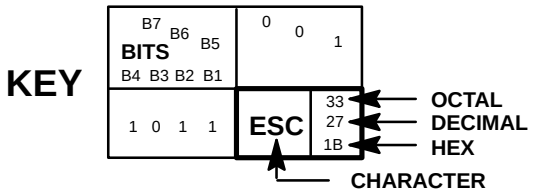
Multinational Primary Character Set
P–Series Emulation (80–9F=Control Codes)

See the Multinational International Languages Substitution Table for the International Language selected.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0			0 0 1			0 1 0			0 1 1			1 0 0			1 0 1			1 1 0			1 1 1		
		COLUMN 0			1			2			3			4			5			6			7		
0 0 0 0	0	NUL	0 0 0		DLE	20 16 10			40 32 20		0	60 48 30		@	100 64 40		P	120 80 50		`	140 96 60		p	160 112 70	
0 0 0 1	1	SOH	1 1 1		DC1 (XON)	21 17 11		!	41 33 21		1	61 49 31		A	101 65 41		Q	121 81 51		a	141 97 61		q	161 113 71	
0 0 1 0	2	STX	2 2 2		DC2	22 18 12		″	42 34 22		2	62 50 32		B	102 66 42		R	122 82 52		b	142 98 62		r	162 114 72	
0 0 1 1	3	ETX	3 3 3		DC3 (XOFF)	23 19 13		#	43 35 23		3	63 51 33		C	103 67 43		S	123 83 53		c	143 99 63		s	163 115 73	
0 1 0 0	4	EOT	4 4 4		DC4	24 20 14		$	44 36 24		4	64 52 34		D	104 68 44		T	124 84 54		d	144 100 64		t	164 116 74	
0 1 0 1	5	ENQ	5 5 5		NAK	25 21 15		%	45 37 25		5	65 53 35		E	105 69 45		U	125 85 55		e	145 101 65		u	165 117 75	
0 1 1 0	6	ACK	6 6 6		SYN	26 22 16		&	46 38 26		6	66 54 36		F	106 70 46		V	126 86 56		f	146 102 66		v	166 118 76	
0 1 1 1	7	BEL	7 7 7		ETB	27 23 17		´	47 39 27		7	67 55 37		G	107 71 47		W	127 87 57		g	147 103 67		w	167 119 77	
1 0 0 0	8	BS	10 8 8		CAN	30 24 18		(	50 40 28		8	70 56 38		H	110 72 48		X	130 88 58		h	150 104 68		x	170 120 78	
1 0 0 1	9	HT	11 9 9		EM	31 25 19		)	51 41 29		9	71 57 39		I	111 73 49		Y	131 89 59		i	151 105 69		y	171 121 79	
1 0 1 0	10	LF	12 10 0 A		SUB	32 26 1A		*	52 42 2A		:	72 58 3A		J	112 74 4A		Z	132 90 5A		j	152 106 6A		z	172 122 7A	
1 0 1 1	11	VT	13 11 0 B		ESC	33 27 1B		+	53 43 2B		;	73 59 3B		K	113 75 4B		[	133 91 5B		k	153 107 6B		{	173 123 7B	
1 1 0 0	12	FF	14 12 0 C		FS	34 28 1C		,	54 44 2C		<	74 60 3C		L	114 76 4C		\	134 92 5C		l	154 108 6C		¦	174 124 7C	
1 1 0 1	13	CR	15 13 0 D		GS	35 29 1D		–	55 45 2D		=	75 61 3D		M	115 77 4D		]	135 93 5D		m	155 109 6D		}	175 125 7D	
1 1 1 0	14	SO	16 14 0 E		RS	36 30 1E		.	56 46 2E		>	76 62 3E		N	116 78 4E		^	136 94 5E		n	156 110 6E		~	176 126 7E	
1 1 1 1	15	SI	17 15 0 F		US	37 31 1F		/	57 47 2F		?	77 63 3F		O	117 79 4F		_	137 95 5F		o	157 111 6F			177 127 7F	

Multinational Extended Set
P–Series Emulation (80–9F=Control Codes)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	ð	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	=	327 215 D7	ç	347 231 E7	₧	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	ƒ	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	¬	254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	ÿ	255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	®	256 174 AE	3/4	276 190 BE	Î	316 206 CE	Þ	336 222 DE	î	356 238 EE	þ	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	¯	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF	ˇ	377 255 FF

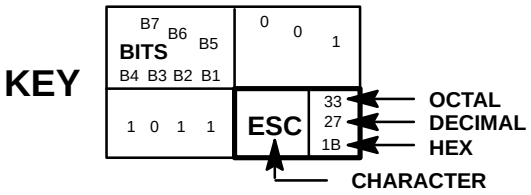
Multinational Primary Character Set
P–Series Emulation (80–9F=Printable Symbols)

See the Multinational International Languages Substitution Table for the International Language selected.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	COLUMN 0			1			2			3			4			5			6			7				
0 0 0 0	0	NUL	0	0	DLE	20	16		40	32	0	60	48	@	100	64	P	120	80	`	140	96	p	160	112			
0 0 0 1	1	SOH	1	1	DC1 (XON)	21	17	!	41	33	1	61	49	A	101	65	Q	121	81	a	141	97	q	161	113			
0 0 1 0	2	STX	2	2	DC2	22	18	″	42	34	2	62	50	B	102	66	R	122	82	b	142	98	r	162	114			
0 0 1 1	3	ETX	3	3	DC3 (XOFF)	23	19	#	43	35	3	63	51	C	103	67	S	123	83	c	143	99	s	163	115			
0 1 0 0	4	EOT	4	4	DC4	24	20	$	44	36	4	64	52	D	104	68	T	124	84	d	144	100	t	164	116			
0 1 0 1	5	ENQ	5	5	NAK	25	21	%	45	37	5	65	53	E	105	69	U	125	85	e	145	101	u	165	117			
0 1 1 0	6	ACK	6	6	SYN	26	22	&	46	38	6	66	54	F	106	70	V	126	86	f	146	102	v	166	118			
0 1 1 1	7	BEL	7	7	ETB	27	23	′	47	39	7	67	55	G	107	71	W	127	87	g	147	103	w	167	119			
1 0 0 0	8	BS	10	8	CAN	30	24	(	50	40	8	70	56	H	110	72	X	130	88	h	150	104	x	170	120			
1 0 0 1	9	HT	11	9	EM	31	25	)	51	41	9	71	57	I	111	73	Y	131	89	i	151	105	y	171	121			
1 0 1 0	10	LF	12	10	SUB	32	26	*	52	42	:	72	58	J	112	74	Z	132	90	j	152	106	z	172	122			
1 0 1 1	11	VT	13	11	ESC	33	27	+	53	43	;	73	59	K	113	75	[	133	91	k	153	107	{	173	123			
1 1 0 0	12	FF	14	12	FS	34	28	,	54	44	<	74	60	L	114	76	\	134	92	l	154	108	¦	174	124			
1 1 0 1	13	CR	15	13	GS	35	29	–	55	45	=	75	61	M	115	77	]	135	93	m	155	109	}	175	125			
1 1 1 0	14	SO	16	14	RS	36	30	.	56	46	>	76	62	N	116	78	^	136	94	n	156	110	~	176	126			
1 1 1 1	15	SI	17	15	US	37	31	/	57	47	?	77	63	O	117	79	_	137	95	o	157	111		177	127			

Multinational Extended Set
P–Series Emulation (80–9F=Printable Symbols)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 8		0 0 1 / 9		0 1 0 / 10		0 1 1 / 11		1 0 0 / 12		1 0 1 / 13		1 1 0 / 14		1 1 1 / 15	
0 0 0 0	0	IJ	200 128 80	¯ *	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	ð	360 240 F0
0 0 0 1	1	ij	201 129 81		221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ̃	321 209 D1	á	341 225 E1	ñ̃	361 241 F1
0 0 1 0	2	₧	202 130 82		222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	|	203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã̃	303 195 C3	Ó	323 211 D3	ã̃	343 227 E3	ó	363 243 F3
0 1 0 0	4	₸	204 132 84		224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	⊥	205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ̃	325 213 D5	å	345 229 E5	õ̃	365 245 F5
0 1 1 0	6	Ğ	206 134 86		226 150 96	|	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	ğ	207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	═	327 215 D7	ç	347 231 E7	₧	367 247 F7
1 0 0 0	8	Ş	210 136 88		230 152 98	″	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	ş	211 137 89		231 153 99	ƒ	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	İ	212 138 8A		232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	¨	213 139 8B		233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	ˇ	214 140 8C		234 156 9C	¬	254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	ƒ	215 141 8D		235 157 9D	ÿ	255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	═	216 142 8E		236 158 9E	®	256 174 AE	3/4	276 190 BE	Î	316 206 CE	Þ	336 222 DE	î	356 238 EE	þ	376 254 FE
1 1 1 1	15	¯ ;	217 143 8F		237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF	ˇ	377 255 FF

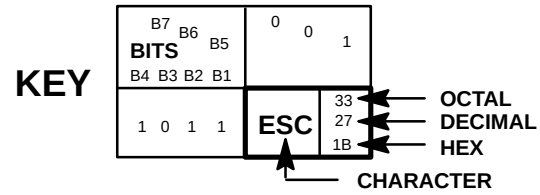
Multinational Primary Character Set
Serial Matrix Emulation (80–9F=Control Codes)

See the Multinational International Languages Substitution Table for the International Language selected.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0			0 0 1			0 1 0			0 1 1			1 0 0			1 0 1			1 1 0			1 1 1		
		COLUMN 0			1			2			3			4			5			6			7		
0 0 0 0	0	NUL	0 0 0		DLE	20 16 10			40 32 20		0	60 48 30		@	100 64 40		P	120 80 50		`	140 96 60		p	160 112 70	
0 0 0 1	1	SOH	1 1 1		DC1 (XON)	21 17 11		!	41 33 21		1	61 49 31		A	101 65 41		Q	121 81 51		a	141 97 61		q	161 113 71	
0 0 1 0	2	STX	2 2 2		DC2	22 18 12		″	42 34 22		2	62 50 32		B	102 66 42		R	122 82 52		b	142 98 62		r	162 114 72	
0 0 1 1	3	ETX	3 3 3		DC3 (XOFF)	23 19 13		#	43 35 23		3	63 51 33		C	103 67 43		S	123 83 53		c	143 99 63		s	163 115 73	
0 1 0 0	4	EOT	4 4 4		DC4	24 20 14		$	44 36 24		4	64 52 34		D	104 68 44		T	124 84 54		d	144 100 64		t	164 116 74	
0 1 0 1	5	ENQ	5 5 5		NAK	25 21 15		%	45 37 25		5	65 53 35		E	105 69 45		U	125 85 55		e	145 101 65		u	165 117 75	
0 1 1 0	6	ACK	6 6 6		SYN	26 22 16		&	46 38 26		6	66 54 36		F	106 70 46		V	126 86 56		f	146 102 66		v	166 118 76	
0 1 1 1	7	BEL	7 7 7		ETB	27 23 17		´	47 39 27		7	67 55 37		G	107 71 47		W	127 87 57		g	147 103 67		w	167 119 77	
1 0 0 0	8	BS	10 8 8		CAN	30 24 18		(	50 40 28		8	70 56 38		H	110 72 48		X	130 88 58		h	150 104 68		x	170 120 78	
1 0 0 1	9	HT	11 9 9		EM	31 25 19		)	51 41 29		9	71 57 39		I	111 73 49		Y	131 89 59		i	151 105 69		y	171 121 79	
1 0 1 0	10	LF	12 10 0 A		SUB	32 26 1A		*	52 42 2A		:	72 58 3A		J	112 74 4A		Z	132 90 5A		j	152 106 6A		z	172 122 7A	
1 0 1 1	11	VT	13 11 0 B		ESC	33 27 1B		+	53 43 2B		;	73 59 3B		K	113 75 4B		[	133 91 5B		k	153 107 6B		{	173 123 7B	
1 1 0 0	12	FF	14 12 0 C		FS	34 28 1C		,	54 44 2C		<	74 60 3C		L	114 76 4C		\	134 92 5C		l	154 108 6C		¦	174 124 7C	
1 1 0 1	13	CR	15 13 0 D		GS	35 29 1D		–	55 45 2D		=	75 61 3D		M	115 77 4D		]	135 93 5D		m	155 109 6D		}	175 125 7D	
1 1 1 0	14	SO	16 14 0 E		RS	36 30 1E		.	56 46 2E		>	76 62 3E		N	116 78 4E		^	136 94 5E		n	156 110 6E		~	176 126 7E	
1 1 1 1	15	SI	17 15 0 F		US	37 31 1F		/	57 47 2F		?	77 63 3F		O	117 79 4F		_	137 95 5F		o	157 111 6F		DEL	177 127 7F	

Multinational Extended Set
Serial Matrix Emulation (80–9F=Control Codes)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	ð	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	|	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	=	327 215 D7	ç	347 231 E7	₧	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	ƒ	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	¬	254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	ÿ	255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	®	256 174 AE	3/4	276 190 BE	Î	316 206 CE	Þ	336 222 DE	î	356 238 EE	þ	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	¯	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF	ˇ	377 255 FF

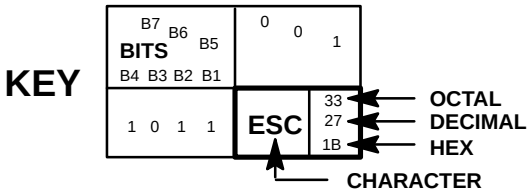
Multinational Primary Character Set
Serial Matrix Emulation (80–9F=Printable Symbols)

See the Multinational International Languages Substitution Table for the International Language selected.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0	COLUMN 0		0 0 1	1		0 1 0	2		0 1 1	3		1 0 0	4		1 0 1	5		1 1 0	6		1 1 1	7	
0 0 0 0	0	NUL	0 0 0		DLE	20 16 10		40 32 20	0		60 48 30	@		100 64 40	P		120 80 50	`		140 96 60	p		160 112 70
0 0 0 1	1	SOH	1 1 1		DC1 (XON)	21 17 11	!	41 33 21	1		61 49 31	A		101 65 41	Q		121 81 51	a		141 97 61	q		161 113 71
0 0 1 0	2	STX	2 2 2		DC2	22 18 12	″	42 34 22	2		62 50 32	B		102 66 42	R		122 82 52	b		142 98 62	r		162 114 72
0 0 1 1	3		3 3 3		DC3 (XOFF)	23 19 13	#	43 35 23	3		63 51 33	C		103 67 43	S		123 83 53	c		143 99 63	s		163 115 73
0 1 0 0	4		4 4 4		DC4	24 20 14	$	44 36 24	4		64 52 34	D		104 68 44	T		124 84 54	d		144 100 64	t		164 116 74
0 1 0 1	5		5 5 5			25 21 15	%	45 37 25	5		65 53 35	E		105 69 45	U		125 85 55	e		145 101 65	u		165 117 75
0 1 1 0	6		6 6 6		SYN	26 22 16	&	46 38 26	6		66 54 36	F		106 70 46	V		126 86 56	f		146 102 66	v		166 118 76
0 1 1 1	7	BEL	7 7 7		ETB	27 23 17	´	47 39 27	7		67 55 37	G		107 71 47	W		127 87 57	g		147 103 67	w		167 119 77
1 0 0 0	8	BS	10 8 8		CAN	30 24 18	(	50 40 28	8		70 56 38	H		110 72 48	X		130 88 58	h		150 104 68	x		170 120 78
1 0 0 1	9	HT	11 9 9		EM	31 25 19	)	51 41 29	9		71 57 39	I		111 73 49	Y		131 89 59	i		151 105 69	y		171 121 79
1 0 1 0	10	LF	12 10 0 A		SUB	32 26 1A	*	52 42 2A	:		72 58 3A	J		112 74 4A	Z		132 90 5A	j		152 106 6A	z		172 122 7A
1 0 1 1	11	VT	13 11 0 B		ESC	33 27 1B	+	53 43 2B	;		73 59 3B	K		113 75 4B	[		133 91 5B	k		153 107 6B	{		173 123 7B
1 1 0 0	12	FF	14 12 0 C		FS	34 28 1C	,	54 44 2C	<		74 60 3C	L		114 76 4C	\		134 92 5C	l		154 108 6C	¦		174 124 7C
1 1 0 1	13	CR	15 13 0 D		GS	35 29 1D	–	55 45 2D	=		75 61 3D	M		115 77 4D	]		135 93 5D	m		155 109 6D	}		175 125 7D
1 1 1 0	14	SO	16 14 0 E		RS	36 30 1E	.	56 46 2E	>		76 62 3E	N		116 78 4E	^		136 94 5E	n		156 110 6E	~		176 126 7E
1 1 1 1	15	SI	17 15 0 F		US	37 31 1F	/	57 47 2F	?		77 63 3F	O		117 79 4F	_		137 95 5F	o		157 111 6F	DEL		177 127 7F

Multinational Extended Set
Serial Matrix Emulation (80–9F=Printable Symbols)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 8		0 0 1 / 9		0 1 0 / 10		0 1 1 / 11		1 0 0 / 12		1 0 1 / 13		1 1 0 / 14		1 1 1 / 15	
0 0 0 0	0	IJ	200 128 80	¯ *	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	ð	360 240 F0
0 0 0 1	1	ij	201 129 81		221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ̃	321 209 D1	á	341 225 E1	ñ̃	361 241 F1
0 0 1 0	2	₧	202 130 82		222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	|	203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã̃	303 195 C3	Ó	323 211 D3	ã̃	343 227 E3	ó	363 243 F3
0 1 0 0	4	₸	204 132 84		224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	⊥	205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ̃	325 213 D5	å	345 229 E5	õ̃	365 245 F5
0 1 1 0	6	Ğ	206 134 86		226 150 96	|	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	ğ	207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	═	327 215 D7	ç	347 231 E7	₧	367 247 F7
1 0 0 0	8	Ş	210 136 88		230 152 98	⁄⁄	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	ş	211 137 89		231 153 99	ƒ	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	İ	212 138 8A		232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	¨	213 139 8B		233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	ˇ	214 140 8C		234 156 9C	¬	254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	ƒ	215 141 8D		235 157 9D	ÿ	255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	═	216 142 8E		236 158 9E	®	256 174 AE	3/4	276 190 BE	Î	316 206 CE	Þ	336 222 DE	î	356 238 EE	þ	376 254 FE
1 1 1 1	15	¯ ;	217 143 8F		237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF	ˇ	377 255 FF

Multinational Primary Character Set in OCR–A

See the Multinational International Languages Substitution Table for the International Language selected.

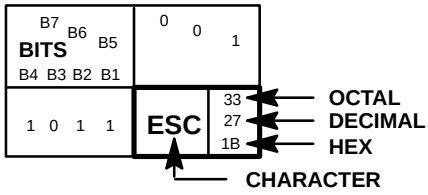
NOTE: OCR–A characters can only be selected when using the OCR–A print mode. The OCR charts indicate appropriate character codes only and do not represent the actual character style and shape. Regular print attributes (such as bold, super/subscript, emphasized, etc.) are not functional in this mode.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	′	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	−	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

NOTE: P–Series and Serial Matrix Control Codes and Printable Symbols for the OCR–A character set are identical to the Multinational Character Set charts shown on pages B–12 through B–19.

KEY



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0	COLUMN 8	0 0 1	9	0 1 0	10	0 1 1	11	1 0 0	12	1 0 1	13	1 1 0	14	1 1 1	15
0 0 0 0	0		200 128 80		220 144 90		240 160 A0		260 176 B0		300 192 C0		320 208 D0		340 224 E0		360 240 F0
0 0 0 1	1		201 129 81		221 145 91		241 161 A1		261 177 B1		301 193 C1	Ñ	321 209 D1		341 225 E1		361 241 F1
0 0 1 0	2		202 130 82		222 146 92		242 162 A2		262 178 B2		302 194 C2		322 210 D2		342 226 E2		362 242 F2
0 0 1 1	3		203 131 83		223 147 93	£	243 163 A3		263 179 B3		303 195 C3	ȯ	323 211 D3		343 227 E3		363 243 F3
0 1 0 0	4		204 132 84		224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	┤	324 212 D4	ä	344 228 E4	┐	364 244 F4
0 1 0 1	5		205 133 85		225 149 95	¥	245 165 A5		265 181 B5	Å	305 197 C5		325 213 D5	å	345 229 E5		365 245 F5
0 1 1 0	6		206 134 86		226 150 96	|	246 166 A6		266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7		207 135 87		227 151 97		247 167 A7		267 183 B7		307 199 C7		327 215 D7		347 231 E7		367 247 F7
1 0 0 0	8		210 136 88		230 152 98		250 168 A8	¬	270 184 B8	—	310 200 C8	Ø	330 216 D8		350 232 E8		370 248 F8
1 0 0 1	9		211 137 89		231 153 99		251 169 A9		271 185 B9		311 201 C9		331 217 D9		351 233 E9		371 249 F9
1 0 1 0	10		212 138 8A		232 154 9A		252 170 AA		272 186 BA	I	312 202 CA		332 218 DA		352 234 EA		372 250 FA
1 0 1 1	11		213 139 8B		233 155 9B		253 171 AB		273 187 BB	I	313 203 CB		333 219 DB		353 235 EB	ʃ	373 251 FB
1 1 0 0	12		214 140 8C		234 156 9C		254 172 AC		274 188 BC		314 204 CC	Ü	334 220 DC		354 236 EC	ü	374 252 FC
1 1 0 1	13		215 141 8D		235 157 9D	^	255 173 AD		275 189 BD	⊥	315 205 CD		335 221 DD		355 237 ED		375 253 FD
1 1 1 0	14		216 142 8E		236 158 9E		256 174 AE		276 190 BE	–	316 206 CE		336 222 DE		356 238 EE		376 254 FE
1 1 1 1	15		217 143 8F		237 159 9F	–	257 175 AF		277 191 BF		317 207 CF		337 223 DF		357 239 EF		377 255 FF

Multinational Primary Character Set in OCR–B

See the Multinational International Languages Substitution Table for the International Language selected.

NOTE: OCR–B characters can only be selected when using the OCR–B print mode. The OCR charts indicate appropriate character codes only and do not represent the actual character style and shape. Regular print attributes (such as bold, super/subscript, emphasized, etc.) are not functional in this mode.

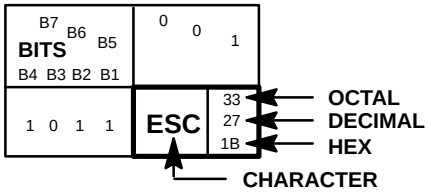
* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 0		0 0 1 / 1		0 1 0 / 2		0 1 1 / 3		1 0 0 / 4		1 0 1 / 5		1 1 0 / 6		1 1 1 / 7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	'	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	¦	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

Multinational Extended Character Set in OCR–B

NOTE: P–Series and Serial Matrix Control Codes and Printable Symbols for the OCR–B character set are identical to the Multinational Character Set charts shown on pages B–12 through B–19.

KEY



* IF ENABLED

B8*		1			1			1			1			1			1			1			1			1		
B7 B6 B5 / BITS / B4 B3 B2 B1	ROW	0 0 0			0 0 1			0 1 0			0 1 1			1 0 0			1 0 1			1 1 0			1 1 1		
	COLUMN	8			9			10			11			12			13			14			15		
0 0 0 0	0		200 128 80			220 144 90			240 160 A0			260 176 B0	↑	300 192 C0	Z	320 208 D0			340 224 E0	z	360 240 F0						
0 0 0 1	1		201 129 81			221 145 91	¡		241 161 A1			261 177 B1	↓	301 193 C1	Ñ	321 209 D1			341 225 E1		361 241 F1						
0 0 1 0	2		202 130 82			222 146 92			242 162 A2			262 178 B2	→	302 194 C2		322 210 D2			342 226 E2		362 242 F2						
0 0 1 1	3		203 131 83			223 147 93	£		243 163 A3			263 179 B3		303 195 C3	ȯ	323 211 D3			343 227 E3		363 243 F3						
0 1 0 0	4		204 132 84			224 148 94	¤		244 164 A4	'		264 180 B4	Ä	304 196 C4		324 212 D4	ä		344 228 E4		364 244 F4						
0 1 0 1	5		205 133 85			225 149 95	¥		245 165 A5			265 181 B5	Å	305 197 C5		325 213 D5	å		345 229 E5		365 245 F5						
0 1 1 0	6		206 134 86			226 150 96	¦		246 166 A6			266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ		346 230 E6	ö	366 246 F6						
0 1 1 1	7		207 135 87			227 151 97	§		247 167 A7			267 183 B7		307 199 C7		327 215 D7	ç		347 231 E7		367 247 F7						
1 0 0 0	8		210 136 88			230 152 98			250 168 A8	–		270 184 B8	—	310 200 C8	Ø	330 216 D8			350 232 E8	ø	370 248 F8						
1 0 0 1	9		211 137 89			231 153 99			251 169 A9			271 185 B9		311 201 C9		331 217 D9	é		351 233 E9		371 249 F9						
1 0 1 0	10		212 138 8A			232 154 9A			252 170 AA			272 186 BA	I	312 202 CA		332 218 DA	ë		352 234 EA		372 250 FA						
1 0 1 1	11	··	213 139 8B			233 155 9B			253 171 AB			273 187 BB	I	313 203 CB		333 219 DB			353 235 EB		373 251 FB						
1 1 0 0	12		214 140 8C			234 156 9C			254 172 AC			274 188 BC		314 204 CC	Ü	334 220 DC			354 236 EC		374 252 FC						
1 1 0 1	13		215 141 8D			235 157 9D	^		255 173 AD			275 189 BD	⊥I	315 205 CD	IJ	335 221 DD			355 237 ED	ij	375 253 FD						
1 1 1 0	14		216 142 8E			236 158 9E			256 174 AE			276 190 BE	–	316 206 CE		336 222 DE			356 238 EE		376 254 FE						
1 1 1 1	15		217 143 8F			237 159 9F	–		257 175 AF	¿		277 191 BF	—	317 207 CF	β	337 223 DF			357 239 EF		377 255 FF						

Multinational International Languages Substitution Table

LANGUAGE	Hex Address 005B	005D	005E
ASCII	[	]	^
EBCDIC	¢	!	¬

Example: *005B = [in ASCII*
005B = ¢ in EBCDIC

ECMA–94 Latin 1 Character Set Charts

ECMA–94 Latin 1 Primary Character Set
P–Series Emulation (80–9F=Control Codes)

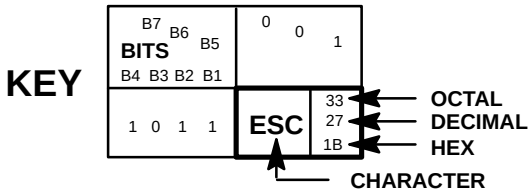
See the ECMA–94 Latin 1 International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0	COLUMN 0	0 0 1	1	0 1 0	2	0 1 1	3	1 0 0	4	1 0 1	5	1 1 0	6	1 1 1	7
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	´	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

ECMA–94 Latin 1 Extended Set
P–Series Emulation (80–9F=Control Codes)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	ð	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	×	327 215 D7	ç	347 231 E7	÷	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	¬	254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	ÿ	255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	®	256 174 AE	3/4	276 190 BE	Î	316 206 CE	Þ	336 222 DE	î	356 238 EE	þ	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	¯	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

ECMA–94 Latin 1 Primary Character Set
P–Series Emulation (80–9F=Printable Symbols)

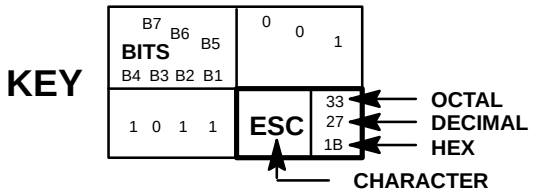
See the ECMA–94 Latin 1 International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	´	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

ECMA–94 Latin 1 Extended Set
P–Series Emulation (80–9F=Printable Symbols)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	IJ	200 128 80	¯ *	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	ð	360 240 F0
0 0 0 1	1	ij	201 129 81	■	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	₧	202 130 82		222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	|	203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	₸	204 132 84		224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	₹	205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	₲	206 134 86		226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	₰	207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	×	327 215 D7	ç	347 231 E7	÷	367 247 F7
1 0 0 0	8	₴	210 136 88		230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	₹	211 137 89		231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	₺	212 138 8A		232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	₸	213 139 8B		233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	₹	214 140 8C		234 156 9C	¬	254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	₹	215 141 8D		235 157 9D	ÿ	255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	₹	216 142 8E		236 158 9E	®	256 174 AE	3/4	276 190 BE	Î	316 206 CE	Þ	336 222 DE	î	356 238 EE	þ	376 254 FE
1 1 1 1	15	¯ ;	217 143 8F		237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

ECMA–94 Latin 1 Primary Character Set
Serial Matrix Emulation (80–9F=Control Codes)

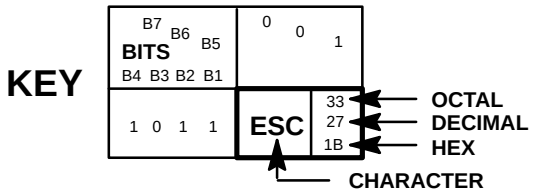
See the ECMA–94 Latin 1 International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0			0 0 1			0 1 0			0 1 1			1 0 0			1 0 1			1 1 0			1 1 1		
		COLUMN 0			1			2			3			4			5			6			7		
0 0 0 0	0	NUL	0 0 0		DLE	20 16 10			40 32 20		0	60 48 30		@	100 64 40		P	120 80 50		`	140 96 60		p	160 112 70	
0 0 0 1	1	SOH	1 1 1		DC1 (XON)	21 17 11		!	41 33 21		1	61 49 31		A	101 65 41		Q	121 81 51		a	141 97 61		q	161 113 71	
0 0 1 0	2	STX	2 2 2		DC2	22 18 12		"	42 34 22		2	62 50 32		B	102 66 42		R	122 82 52		b	142 98 62		r	162 114 72	
0 0 1 1	3	ETX	3 3 3		DC3 (XOFF)	23 19 13		#	43 35 23		3	63 51 33		C	103 67 43		S	123 83 53		c	143 99 63		s	163 115 73	
0 1 0 0	4	EOT	4 4 4		DC4	24 20 14		$	44 36 24		4	64 52 34		D	104 68 44		T	124 84 54		d	144 100 64		t	164 116 74	
0 1 0 1	5	ENQ	5 5 5		NAK	25 21 15		%	45 37 25		5	65 53 35		E	105 69 45		U	125 85 55		e	145 101 65		u	165 117 75	
0 1 1 0	6	ACK	6 6 6		SYN	26 22 16		&	46 38 26		6	66 54 36		F	106 70 46		V	126 86 56		f	146 102 66		v	166 118 76	
0 1 1 1	7	BEL	7 7 7		ETB	27 23 17		´	47 39 27		7	67 55 37		G	107 71 47		W	127 87 57		g	147 103 67		w	167 119 77	
1 0 0 0	8	BS	10 8 8		CAN	30 24 18		(	50 40 28		8	70 56 38		H	110 72 48		X	130 88 58		h	150 104 68		x	170 120 78	
1 0 0 1	9	HT	11 9 9		EM	31 25 19		)	51 41 29		9	71 57 39		I	111 73 49		Y	131 89 59		i	151 105 69		y	171 121 79	
1 0 1 0	10	LF	12 10 0 A		SUB	32 26 1A		*	52 42 2A		:	72 58 3A		J	112 74 4A		Z	132 90 5A		j	152 106 6A		z	172 122 7A	
1 0 1 1	11	VT	13 11 0 B		ESC	33 27 1B		+	53 43 2B		;	73 59 3B		K	113 75 4B		[	133 91 5B		k	153 107 6B		{	173 123 7B	
1 1 0 0	12	FF	14 12 0 C		FS	34 28 1C		,	54 44 2C		<	74 60 3C		L	114 76 4C		\	134 92 5C		l	154 108 6C		|	174 124 7C	
1 1 0 1	13	CR	15 13 0 D		GS	35 29 1D		–	55 45 2D		=	75 61 3D		M	115 77 4D		]	135 93 5D		m	155 109 6D		}	175 125 7D	
1 1 1 0	14	SO	16 14 0 E		RS	36 30 1E		.	56 46 2E		>	76 62 3E		N	116 78 4E		^	136 94 5E		n	156 110 6E		~	176 126 7E	
1 1 1 1	15	SI	17 15 0 F		US	37 31 1F		/	57 47 2F		?	77 63 3F		O	117 79 4F		_	137 95 5F		o	157 111 6F		DEL	177 127 7F	

ECMA–94 Latin 1 Extended Set
Serial Matrix Emulation (80–9F=Control Codes)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	º	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	ð	360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	×	327 215 D7	ç	347 231 E7	÷	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C	¬	254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D	ÿ	255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E	®	256 174 AE	3/4	276 190 BE	Î	316 206 CE	Þ	336 222 DE	î	356 238 EE	þ	376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F	¯	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

ECMA–94 Latin 1 Primary Character Set
Serial Matrix Emulation (80–9F=Printable Symbols)

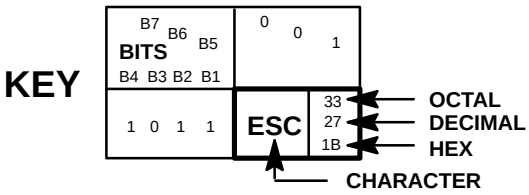
See the ECMA–94 Latin 1 International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	"	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5		5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	´	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

ECMA–94 Latin 1 Extended Set
Serial Matrix Emulation (80–9F=Printable Symbols)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 8		0 0 1 / 9		0 1 0 / 10		0 1 1 / 11		1 0 0 / 12		1 0 1 / 13		1 1 0 / 14		1 1 1 / 15	
0 0 0 0	0	IJ	200 128 80	¯ *	220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0	Ð	320 208 D0	à	340 224 E0	đ	360 240 F0
0 0 0 1	1	ij	201 129 81	▮	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ̃	321 209 D1	á	341 225 E1	ñ̃	361 241 F1
0 0 1 0	2	₧	202 130 82		222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	|	203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã̃	303 195 C3	Ó	323 211 D3	ã̃	343 227 E3	ó	363 243 F3
0 1 0 0	4	₸	204 132 84		224 148 94	¤	244 164 A4	´	264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	⊥	205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ̃	325 213 D5	å	345 229 E5	õ̃	365 245 F5
0 1 1 0	6	₲	206 134 86		226 150 96	¦	246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	ğ	207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	×	327 215 D7	ç	347 231 E7	÷	367 247 F7
1 0 0 0	8	Ş	210 136 88		230 152 98	¨	250 168 A8	¸	270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	ş	211 137 89		231 153 99	©	251 169 A9	¹	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	₺	212 138 8A		232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	¨	213 139 8B		233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	ˇ	214 140 8C		234 156 9C	¬	254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	*f*	215 141 8D		235 157 9D	ÿ	255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ý	335 221 DD	í	355 237 ED	ý	375 253 FD
1 1 1 0	14	═	216 142 8E		236 158 9E	®	256 174 AE	3/4	276 190 BE	Î	316 206 CE	Þ	336 222 DE	î	356 238 EE	þ	376 254 FE
1 1 1 1	15	¨ ;	217 143 8F		237 159 9F	—	257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

ECMA–94 Latin 1 International Languages Substitution Table

	Hex Address													
LANGUAGE	**0021**	**0022**	**0023**	**0024**	**0040**	**005B**	**005C**	**005D**	**005E**	**0060**	**007B**	**007C**	**007D**	**007E**
ASCII	!	″	#	$	@	[	\	]	^	`	{	|	}	~
German	!	″	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
Swedish	!	″	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Danish	!	″	#	$	@	Æ	Ø	Å	^	°	æ	ø	å	~
Norwegian	!	″	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Finnish	!	″	#	¤	@	Ä	Ö	Å	^	`	ä	ö	å	ü
English	!	″	£	$	@	[	\	]	^	`	{	|	}	~
Dutch	!	″	£	$	@	[	IJ	]	^	`	{	ij	}	~
French	!	″	#	$	à	û	ç	§	ô	ê	é	ù	è	î
Spanish	!	″	₧	$	@	Ã	Ñ	Õ	¡	`	ã	ñ	õ	¿
Italian	!	″	#	$	§	°	é	|	^	ù	à	ò	è	ì
Turkish	Ⱦ	Ç	ç	ı	@	Ğ	Ö	Ü	ğ	Ş	ş	ö	ü	ı
Japanese	!	″	#	$	@	[	¥	]	^	`	{	|	}	~

Example: *005B = [in ASCII*
005B = Æ in Danish

DEC Multinational Character Set Charts

DEC Multinational Primary Character Set
P–Series Emulation (80–9F=Control Codes)

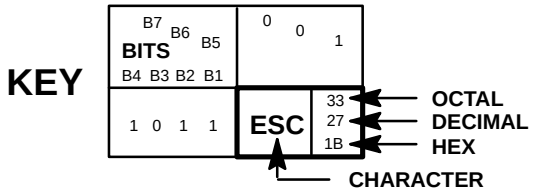
See the DEC Multinational International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 0			0 0 1 / 1			0 1 0 / 2			0 1 1 / 3			1 0 0 / 4			1 0 1 / 5			1 1 0 / 6			1 1 1 / 7		
0 0 0 0	0	NUL	0 0 0		DLE	20 16 10			40 32 20		0	60 48 30		@	100 64 40		P	120 80 50		`	140 96 60		p	160 112 70	
0 0 0 1	1	SOH	1 1 1		DC1 (XON)	21 17 11		!	41 33 21		1	61 49 31		A	101 65 41		Q	121 81 51		a	141 97 61		q	161 113 71	
0 0 1 0	2	STX	2 2 2		DC2	22 18 12		″	42 34 22		2	62 50 32		B	102 66 42		R	122 82 52		b	142 98 62		r	162 114 72	
0 0 1 1	3	ETX	3 3 3		DC3 (XOFF)	23 19 13		#	43 35 23		3	63 51 33		C	103 67 43		S	123 83 53		c	143 99 63		s	163 115 73	
0 1 0 0	4	EOT	4 4 4		DC4	24 20 14		$	44 36 24		4	64 52 34		D	104 68 44		T	124 84 54		d	144 100 64		t	164 116 74	
0 1 0 1	5	ENQ	5 5 5		NAK	25 21 15		%	45 37 25		5	65 53 35		E	105 69 45		U	125 85 55		e	145 101 65		u	165 117 75	
0 1 1 0	6	ACK	6 6 6		SYN	26 22 16		&	46 38 26		6	66 54 36		F	106 70 46		V	126 86 56		f	146 102 66		v	166 118 76	
0 1 1 1	7	BEL	7 7 7		ETB	27 23 17		´	47 39 27		7	67 55 37		G	107 71 47		W	127 87 57		g	147 103 67		w	167 119 77	
1 0 0 0	8	BS	10 8 8		CAN	30 24 18		(	50 40 28		8	70 56 38		H	110 72 48		X	130 88 58		h	150 104 68		x	170 120 78	
1 0 0 1	9	HT	11 9 9		EM	31 25 19		)	51 41 29		9	71 57 39		I	111 73 49		Y	131 89 59		i	151 105 69		y	171 121 79	
1 0 1 0	10	LF	12 10 0 A		SUB	32 26 1A		*	52 42 2A		:	72 58 3A		J	112 74 4A		Z	132 90 5A		j	152 106 6A		z	172 122 7A	
1 0 1 1	11	VT	13 11 0 B		ESC	33 27 1B		+	53 43 2B		;	73 59 3B		K	113 75 4B		[	133 91 5B		k	153 107 6B		{	173 123 7B	
1 1 0 0	12	FF	14 12 0 C		FS	34 28 1C		,	54 44 2C		<	74 60 3C		L	114 76 4C		\	134 92 5C		l	154 108 6C		|	174 124 7C	
1 1 0 1	13	CR	15 13 0 D		GS	35 29 1D		–	55 45 2D		=	75 61 3D		M	115 77 4D		]	135 93 5D		m	155 109 6D		}	175 125 7D	
1 1 1 0	14	SO	16 14 0 E		RS	36 30 1E		.	56 46 2E		>	76 62 3E		N	116 78 4E		^	136 94 5E		n	156 110 6E		~	176 126 7E	
1 1 1 1	15	SI	17 15 0 F		US	37 31 1F		/	57 47 2F		?	77 63 3F		O	117 79 4F		_	137 95 5F		o	157 111 6F			177 127 7F	

DEC Multinational Extended Set
P–Series Emulation (80–9F=Control Codes)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	º	260 176 B0	À	300 192 C0		320 208 D0	à	340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	Œ	327 215 D7	ç	347 231 E7	œ	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¤	250 168 A8		270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C		254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D		255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E		256 174 AE		276 190 BE	Î	316 206 CE		336 222 DE	î	356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F		257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

DEC Multinational Primary Character Set
P–Series Emulation (80–9F=Printable Symbols)

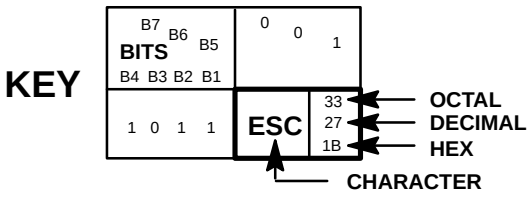
See the DEC Multinational International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0 / COLUMN 0		0 0 1 / 1		0 1 0 / 2		0 1 1 / 3		1 0 0 / 4		1 0 1 / 5		1 1 0 / 6		1 1 1 / 7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3	ETX	3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4	EOT	4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5	ENQ	5 5 5	NAK	25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6	ACK	6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	´	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F		177 127 7F

DEC Multinational Extended Set
P–Series Emulation (80–9F=Printable Symbols)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0	COLUMN 8	0 0 1	9	0 1 0	10	0 1 1	11	1 0 0	12	1 0 1	13	1 1 0	14	1 1 1	15
0 0 0 0	0		200 128 80		220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0		320 208 D0	à	340 224 E0		360 240 F0
0 0 0 1	1		201 129 81		221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ	321 209 D1	á	341 225 E1	ñ	361 241 F1
0 0 1 0	2		202 130 82		222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3		203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã	303 195 C3	Ó	323 211 D3	ã	343 227 E3	ó	363 243 F3
0 1 0 0	4		204 132 84		224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5		205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ	325 213 D5	å	345 229 E5	õ	365 245 F5
0 1 1 0	6		206 134 86		226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7		207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	Œ	327 215 D7	ç	347 231 E7	œ	367 247 F7
1 0 0 0	8		210 136 88		230 152 98	¤	250 168 A8		270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9		211 137 89		231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10		212 138 8A		232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11		213 139 8B		233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12		214 140 8C		234 156 9C		254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13		215 141 8D		235 157 9D		255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD
1 1 1 0	14		216 142 8E		236 158 9E		256 174 AE		276 190 BE	Î	316 206 CE		336 222 DE	î	356 238 EE		376 254 FE
1 1 1 1	15		217 143 8F		237 159 9F		257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

DEC Multinational Primary Character Set
Serial Matrix Emulation (80–9F=Control Codes)

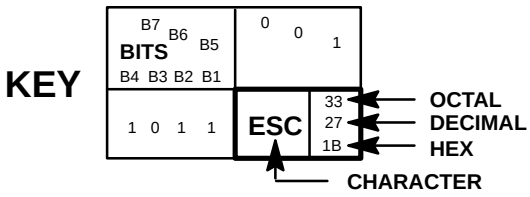
See the DEC Multinational International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0			0			0			0			0			0			0			0			0		
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0			0 0 1			0 1 0			0 1 1			1 0 0			1 0 1			1 1 0			1 1 1		
		COLUMN 0			1			2			3			4			5			6			7		
0 0 0 0	0	NUL	0 0 0		DLE	20 16 10			40 32 20		0	60 48 30		@	100 64 40		P	120 80 50		`	140 96 60		p	160 112 70	
0 0 0 1	1	SOH	1 1 1		DC1 (XON)	21 17 11		!	41 33 21		1	61 49 31		A	101 65 41		Q	121 81 51		a	141 97 61		q	161 113 71	
0 0 1 0	2	STX	2 2 2		DC2	22 18 12		"	42 34 22		2	62 50 32		B	102 66 42		R	122 82 52		b	142 98 62		r	162 114 72	
0 0 1 1	3	ETX	3 3 3		DC3 (XOFF)	23 19 13		#	43 35 23		3	63 51 33		C	103 67 43		S	123 83 53		c	143 99 63		s	163 115 73	
0 1 0 0	4	EOT	4 4 4		DC4	24 20 14		$	44 36 24		4	64 52 34		D	104 68 44		T	124 84 54		d	144 100 64		t	164 116 74	
0 1 0 1	5	ENQ	5 5 5		NAK	25 21 15		%	45 37 25		5	65 53 35		E	105 69 45		U	125 85 55		e	145 101 65		u	165 117 75	
0 1 1 0	6	ACK	6 6 6		SYN	26 22 16		&	46 38 26		6	66 54 36		F	106 70 46		V	126 86 56		f	146 102 66		v	166 118 76	
0 1 1 1	7	BEL	7 7 7		ETB	27 23 17		'	47 39 27		7	67 55 37		G	107 71 47		W	127 87 57		g	147 103 67		w	167 119 77	
1 0 0 0	8	BS	10 8 8		CAN	30 24 18		(	50 40 28		8	70 56 38		H	110 72 48		X	130 88 58		h	150 104 68		x	170 120 78	
1 0 0 1	9	HT	11 9 9		EM	31 25 19		)	51 41 29		9	71 57 39		I	111 73 49		Y	131 89 59		i	151 105 69		y	171 121 79	
1 0 1 0	10	LF	12 10 0 A		SUB	32 26 1A		*	52 42 2A		:	72 58 3A		J	112 74 4A		Z	132 90 5A		j	152 106 6A		z	172 122 7A	
1 0 1 1	11	VT	13 11 0 B		ESC	33 27 1B		+	53 43 2B		;	73 59 3B		K	113 75 4B		[	133 91 5B		k	153 107 6B		{	173 123 7B	
1 1 0 0	12	FF	14 12 0 C		FS	34 28 1C		,	54 44 2C		<	74 60 3C		L	114 76 4C		\	134 92 5C		l	154 108 6C		|	174 124 7C	
1 1 0 1	13	CR	15 13 0 D		GS	35 29 1D		–	55 45 2D		=	75 61 3D		M	115 77 4D		]	135 93 5D		m	155 109 6D		}	175 125 7D	
1 1 1 0	14	SO	16 14 0 E		RS	36 30 1E		.	56 46 2E		>	76 62 3E		N	116 78 4E		^	136 94 5E		n	156 110 6E		~	176 126 7E	
1 1 1 1	15	SI	17 15 0 F		US	37 31 1F		/	57 47 2F		?	77 63 3F		O	117 79 4F		_	137 95 5F		o	157 111 6F		DEL	177 127 7F	

DEC Multinational Extended Set
Serial Matrix Emulation (80–9F=Control Codes)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1	
BITS B7 B6 B5 / B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0	NUL	200 128 80	DLE	220 144 90		240 160 A0	º	260 176 B0	À	300 192 C0		320 208 D0	à	340 224 E0		360 240 F0
0 0 0 1	1	SOH	201 129 81	DC1 (XON)	221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ̃	321 209 D1	á	341 225 E1	ñ̃	361 241 F1
0 0 1 0	2	STX	202 130 82	DC2	222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3	ETX	203 131 83	DC3 (XOFF)	223 147 93	£	243 163 A3	3	263 179 B3	Ã̃	303 195 C3	Ó	323 211 D3	ã̃	343 227 E3	ó	363 243 F3
0 1 0 0	4	EOT	204 132 84	DC4	224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5	ENQ	205 133 85	NAK	225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ̃	325 213 D5	å	345 229 E5	õ̃	365 245 F5
0 1 1 0	6	ACK	206 134 86	SYN	226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7	BEL	207 135 87	ETB	227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	Œ	327 215 D7	ç	347 231 E7	œ	367 247 F7
1 0 0 0	8	BS	210 136 88	CAN	230 152 98	¤	250 168 A8		270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9	HT	211 137 89	EM	231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10	LF	212 138 8A	SUB	232 154 9A	ª	252 170 AA	º	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11	VT	213 139 8B	ESC	233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12	FF	214 140 8C	FS	234 156 9C		254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13	CR	215 141 8D	GS	235 157 9D		255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD
1 1 1 0	14	SO	216 142 8E	RS	236 158 9E		256 174 AE		276 190 BE	Î	316 206 CE		336 222 DE	î	356 238 EE		376 254 FE
1 1 1 1	15	SI	217 143 8F	US	237 159 9F		257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

DEC Multinational Primary Character Set
Serial Matrix Emulation (80–9F=Printable Symbols)

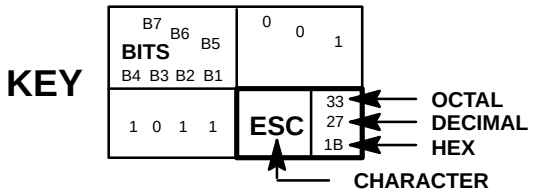
See the DEC Multinational International Languages Substitution Table for the International Language selected.

NOTE: In the OCR–A print mode with ASCII International Language selected, the characters at addresses 5F, 60 and 7E will be replaced by the Fork, Chair, and Hook, respectively.

* IF ENABLED

B8*		0		0		0		0		0		0		0		0	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 0		1		2		3		4		5		6		7	
0 0 0 0	0	NUL	0 0 0	DLE	20 16 10		40 32 20	0	60 48 30	@	100 64 40	P	120 80 50	`	140 96 60	p	160 112 70
0 0 0 1	1	SOH	1 1 1	DC1 (XON)	21 17 11	!	41 33 21	1	61 49 31	A	101 65 41	Q	121 81 51	a	141 97 61	q	161 113 71
0 0 1 0	2	STX	2 2 2	DC2	22 18 12	″	42 34 22	2	62 50 32	B	102 66 42	R	122 82 52	b	142 98 62	r	162 114 72
0 0 1 1	3		3 3 3	DC3 (XOFF)	23 19 13	#	43 35 23	3	63 51 33	C	103 67 43	S	123 83 53	c	143 99 63	s	163 115 73
0 1 0 0	4		4 4 4	DC4	24 20 14	$	44 36 24	4	64 52 34	D	104 68 44	T	124 84 54	d	144 100 64	t	164 116 74
0 1 0 1	5		5 5 5		25 21 15	%	45 37 25	5	65 53 35	E	105 69 45	U	125 85 55	e	145 101 65	u	165 117 75
0 1 1 0	6		6 6 6	SYN	26 22 16	&	46 38 26	6	66 54 36	F	106 70 46	V	126 86 56	f	146 102 66	v	166 118 76
0 1 1 1	7	BEL	7 7 7	ETB	27 23 17	´	47 39 27	7	67 55 37	G	107 71 47	W	127 87 57	g	147 103 67	w	167 119 77
1 0 0 0	8	BS	10 8 8	CAN	30 24 18	(	50 40 28	8	70 56 38	H	110 72 48	X	130 88 58	h	150 104 68	x	170 120 78
1 0 0 1	9	HT	11 9 9	EM	31 25 19	)	51 41 29	9	71 57 39	I	111 73 49	Y	131 89 59	i	151 105 69	y	171 121 79
1 0 1 0	10	LF	12 10 0 A	SUB	32 26 1A	*	52 42 2A	:	72 58 3A	J	112 74 4A	Z	132 90 5A	j	152 106 6A	z	172 122 7A
1 0 1 1	11	VT	13 11 0 B	ESC	33 27 1B	+	53 43 2B	;	73 59 3B	K	113 75 4B	[	133 91 5B	k	153 107 6B	{	173 123 7B
1 1 0 0	12	FF	14 12 0 C	FS	34 28 1C	,	54 44 2C	<	74 60 3C	L	114 76 4C	\	134 92 5C	l	154 108 6C	|	174 124 7C
1 1 0 1	13	CR	15 13 0 D	GS	35 29 1D	–	55 45 2D	=	75 61 3D	M	115 77 4D	]	135 93 5D	m	155 109 6D	}	175 125 7D
1 1 1 0	14	SO	16 14 0 E	RS	36 30 1E	.	56 46 2E	>	76 62 3E	N	116 78 4E	^	136 94 5E	n	156 110 6E	~	176 126 7E
1 1 1 1	15	SI	17 15 0 F	US	37 31 1F	/	57 47 2F	?	77 63 3F	O	117 79 4F	_	137 95 5F	o	157 111 6F	DEL	177 127 7F

DEC Multinational Extended Set
Serial Matrix Emulation (80–9F=Printable Symbols)



* IF ENABLED

B8*		1		1		1		1		1		1		1		1		1	
B7 B6 B5 / BITS B4 B3 B2 B1	ROW	0 0 0		0 0 1		0 1 0		0 1 1		1 0 0		1 0 1		1 1 0		1 1 1	
		COLUMN 8		9		10		11		12		13		14		15	
0 0 0 0	0		200 128 80		220 144 90		240 160 A0	°	260 176 B0	À	300 192 C0		320 208 D0	à	340 224 E0		360 240 F0
0 0 0 1	1		201 129 81		221 145 91	¡	241 161 A1	±	261 177 B1	Á	301 193 C1	Ñ̃	321 209 D1	á	341 225 E1	ñ̃	361 241 F1
0 0 1 0	2		202 130 82		222 146 92	¢	242 162 A2	2	262 178 B2	Â	302 194 C2	Ò	322 210 D2	â	342 226 E2	ò	362 242 F2
0 0 1 1	3		203 131 83		223 147 93	£	243 163 A3	3	263 179 B3	Ã̃	303 195 C3	Ó	323 211 D3	ã̃	343 227 E3	ó	363 243 F3
0 1 0 0	4		204 132 84		224 148 94		244 164 A4		264 180 B4	Ä	304 196 C4	Ô	324 212 D4	ä	344 228 E4	ô	364 244 F4
0 1 0 1	5		205 133 85		225 149 95	¥	245 165 A5	µ	265 181 B5	Å	305 197 C5	Õ̃	325 213 D5	å	345 229 E5	õ̃	365 245 F5
0 1 1 0	6		206 134 86		226 150 96		246 166 A6	¶	266 182 B6	Æ	306 198 C6	Ö	326 214 D6	æ	346 230 E6	ö	366 246 F6
0 1 1 1	7		207 135 87		227 151 97	§	247 167 A7	·	267 183 B7	Ç	307 199 C7	Œ	327 215 D7	ç	347 231 E7	œ	367 247 F7
1 0 0 0	8		210 136 88		230 152 98	¤	250 168 A8		270 184 B8	È	310 200 C8	Ø	330 216 D8	è	350 232 E8	ø	370 248 F8
1 0 0 1	9		211 137 89		231 153 99	©	251 169 A9	1	271 185 B9	É	311 201 C9	Ù	331 217 D9	é	351 233 E9	ù	371 249 F9
1 0 1 0	10		212 138 8A		232 154 9A	a	252 170 AA	o	272 186 BA	Ê	312 202 CA	Ú	332 218 DA	ê	352 234 EA	ú	372 250 FA
1 0 1 1	11		213 139 8B		233 155 9B	«	253 171 AB	»	273 187 BB	Ë	313 203 CB	Û	333 219 DB	ë	353 235 EB	û	373 251 FB
1 1 0 0	12		214 140 8C		234 156 9C		254 172 AC	1/4	274 188 BC	Ì	314 204 CC	Ü	334 220 DC	ì	354 236 EC	ü	374 252 FC
1 1 0 1	13		215 141 8D		235 157 9D		255 173 AD	1/2	275 189 BD	Í	315 205 CD	Ÿ	335 221 DD	í	355 237 ED	ÿ	375 253 FD
1 1 1 0	14		216 142 8E		236 158 9E		256 174 AE		276 190 BE	Î	316 206 CE		336 222 DE	î	356 238 EE		376 254 FE
1 1 1 1	15		217 143 8F		237 159 9F		257 175 AF	¿	277 191 BF	Ï	317 207 CF	β	337 223 DF	ï	357 239 EF		377 255 FF

DEC Multinational International Languages Substitution Table

	Hex Address											
LANGUAGE	**0023**	**0040**	**005B**	**005C**	**005D**	**005E**	**005F**	**0060**	**007B**	**007C**	**007D**	**007E**
ASCII	#	@	[	\	]	^	_	`	{	|	}	~
French	£	à	°	ç	§	^	_	`	é	ù	è	¨
German	#	§	Ä	Ö	Ü	^	_	`	ä	ö	ü	β
English	£	@	[	\	]	^	_	`	{	|	}	~
Norwegian/ Danish	#	Ä	Æ	Ø	Å	Ü	_	ä	æ	ø	å	ü
Swedish	#	É	Ä	Ö	Å	Ü	_	é	ä	ö	å	ü
Italian	£	§	°	ç	é	^	_	ù	à	ò	è	ì
Spanish	£	@	¡	Ñ	¿	^	_	`	°	ñ	ç	~
Japanese	#	@	[	¥	]	^	_	`	{	|	}	~
French Canadian	#	à	â	ç	ê	î	_	ô	é	ù	è	û
Dutch	ù	à	é	ç	ê	î	è	ô	ä	ö	ü	û
Finnish	#	@	Ä	Ö	Å	Ü	_	é	ä	ö	å	ü
Swiss	£	3/4	ij	1/2	|	^	_	`	¨	*f*	1/4	´

Example: *005B = [in ASCII*
005B = Æ in Danish

APPENDIX C
SPECIFICATIONS

Printing Characteristics

Printer throughput, in lines per minute (LPM), is a factor of the selected print mode. The P3000 Series nominal print rates are listed below and assume a tolerance of five percent and an adequate input data rate. Printing speed is independent of the number of characters configured in the character set repertoire. Print lines containing bold/emphasized (shadow) printing, superscripts, subscripts, or elongated (double high) attributes will print at approximately one–half the rates shown below.

PRINT APPLICATION DOT DENSITY (DPI) H X V NOTE	CHARACTERS PER INCH	DOT MATRIX NOTE	PERFORMANCE		
			UPPERCASE ONLY	UPPER & LOWERCASE	PLOT MODE
			LPM	LPM	IPM
CORRESPONDENCE 90 (180) X 96	10 12 15	7 (13) X 9 + 3 6 (11) X 9 + 3 5 (9) X 9 + 3	175	134	18
DATA PROCESSING 60 (120) X 72	10 12 13.3 15 17.1	5 (9) X 7 + 2 4 (7) X 7 + 2 4 (7) X 7 + 2 3 (5) X 7 + 2 3 (5) X 7 + 2	300	240	33
HIGH SPEED 60 (120) X 48	10 12 13.3 15 17.1	5 (9) X 5 + 1 4 (7) X 5 + 1 4 (7) X 5 + 1 3 (5) X 5 + 1 3 (5) X 5 + 1	400	342	50
OCR A and B 120(120) X 144	10	9 (9) X 14 + 2	80	70	16
BAR CODE 145 72.5 (145) X 72	12.1	5 (9) X 5	267	214	15
BARCODE 160 80 (160) X 72	13.3	5 (9) X 5	250	200	14

NOTE A (B) X C, where:
A is maximum horizontal dot density
B is horizontal dot placement density
C is vertical dot density

NOTE D (E) X F + G, where:
D is maximum number of dots that may be placed on E horizontal dot positions
F is number of vertical dots for uppercase symbols
G is number of dots available for descenders

Physical Characteristics

Printer Dimensions

Floor Cabinet Model

Height	41.7” (105.9 cm)
Width	34.0” (86.4 cm)
Depth	28.5” (72.4 cm)
Weight	Approximately 335 lbs. (152 kg)

Pedestal Model

Height	10.5” (27 cm)
Width	24.6” (63 cm)
Depth	20.7” (53 cm)
Weight	Approximately 85 lbs. (39 kg) Shipping weight approximately 98 lbs. (44 kg)

Environmental Characteristics

Temperature

Operating	5 to 40° C
Storage	– 40 to 70° C

Relative Humidity

Operating	10% to 90% (noncondensing)
Storage	5% to 95% (noncondensing)

Acoustic Noise

NOTE: Accoustic noise levels tested per ISO 7779, in the Data Processing print mode at 10 cpi.

P3040	Less than 60 dBA
P3040–12	Less than 65 dBA
P3240	Less than 52 dBA

Electrical Characteristics

Input Power

Voltage	120 or 240 VAC
Phase	Single
Frequency	50 or 60 Hz

Power Rating

	Pedestal	**Floor Cabinet**
Nominal Standby	120 VA 60 Hz (90 Watts)	147 VA 60 Hz (110 Watts)
Nominal Operating	320 VA 60 Hz (215 Watts)	350 VA 60 Hz (235 Watts)

Dissipated Power Per Hour

	Pedestal	**Floor Cabinet**
Standby	307 BTUs	375 BTUs
Printing	734 BTUs	800 BTUs

Data Input Rate (maximum)

Dataproducts	Up to 30,000 characters per second
Centronics	Up to 30,000 characters per second
RS–232	Up to 19.2K baud

RFI

Radio Frequency Interference Tested/Certified to RFI Standards FCC Subpart J of Part 15 Class A; VDE 0871 Class B; CSA C108.8–M1983 Class A.

Interfaces

Type	Resident parallel and serial
Logic Levels	TTL/RS–232
Data Format	ASCII
Compatibility	Centronics, Dataproducts, RS–232C
Buffer Size	2 lines parallel, 1K serial

Forms

Paper

Type	Edge–perforated, fanfold, 3 to 16” wide
Thickness	Single–part – 15 to 100 lb. stock Multi–part – 1– to 6–part forms
Sheet Thickness	0.025” maximum
Drive	Adjustable tractors (6–pin engagement)
Slew Rate	8” per second maximum

Labels

On Backing	One–part continuous perforated fanfold back form. Labels must be placed at least 1/6 inch from the fanfold perforation. Backing adhesive must not be squeezed out during printing.
Sheet Size	3 to 16” wide, including the two standard perforated tractor feed strips. A maximum sheet size of 12” between top and bottom perforations.
Thickness	Not to exceed 0.025” (including backing sheet)

Forms Control

Skip–Over Perforation	1, 1/2, 2/3, 5/6 inch; Control Panel Selectable
Vertical Format Units (VFU)	IBM Serial Matrix Vertical Tabs Programmable P–Series EVFU Dataproducts compatible direct access DVFU

Miscellaneous

Ribbon

Standard	*Printronix* P/N 107463
Carbon Black	*Printronix* P/N 108506 OCR
Fabric	Nylon, 1 inch x 60 yards spool–to–spool; Metal reverses on each end

NOTE: Use only ribbons that meet the stated specifications.

Miscellaneous (continued)

Cleaning

Interval	3 months or 250 hours of operation

Character Sets

ASCII Standard	Up to 229 characters Data Processing, Correspondence, High Speed

International

ECMA–94 Latin 1	**IBM PC**
ASCII (USA)	ASCII (USA)
German	French
Swedish	German
Danish	English
Norwegian	Danish
Finnish	Swedish
English	Italian
Dutch	Spanish
French	Japanese
Spanish	French Canadian
Italian	Latin American
Turkish	
Japanese	

Multinational	**DEC Multinational**
ASCII	ASCII (USA)
EBCDIC	French
	German
	English
	Norwegian/Danish
	Swedish
	Italian
	Spanish
	Japanese
	French Canadian
	Dutch
	Finnish
	Swiss

APPENDIX D

CONTROL CODE CROSS REFERENCE

The following lists provide the programming control codes alphabetically by function and alphabetically by code. In the Programming chapter, an alphabetical list of control code functions is presented by functional groups (format, paper motion, graphics, etc.).

NOTE: Some control code functions can be accomplished using another control code sequence or via control panel selection. SFCC refers to one of five different Special Function Control Code introducers available in the P–Series emulation mode; refer to the Programming chapter for details.

Alphabetical By Function

Function	P–Series	Serial	Page
Backspace	BS	BS	6–7
Bell	BEL	BEL	6–8
Bit Image Mode, Double Density	N/A	ESC L	6–10
Bit Image Mode, Dbl Density Dbl Speed	N/A	ESC Y	6–11
Bit Image Mode, Quadruple Density	N/A	ESC Z	6–12
Bit Image Mode, Single Density	N/A	ESC K	6–9
Bold Print	SFCC G	ESC G	6–13
Bold Print (1 line only)	SFCC j		6–13
Bold Print Reset	SFCC H	ESC H	6–14
Cancel	N/A	CAN	6–15
Carriage Return	CR	CR	6–16
Character Pitch 10 cpi	N/A	ESC P	6–17
Character Pitch 12 cpi	N/A	ESC M	6–18
		ESC:	
Character Set Select	SFCC l	ESC l	6–19
Character Set Select (Control Codes)	SFCC 7	ESC 7	6–22
Character Set Select: International	SFCC R	ESC R	6–25
	SFCC PSET		
Character Set Select (Printable Symbols)	SFCC 6	ESC 6	6–23
Character Set Select (Printable Symbols)	N/A	ESC u	6–24
Character Set Select: Extended (ECMA)	SFCC OSET	N/A	6–27
Condensed Print	N/A	SI	6–28
		ESC SI	
Condensed Print Reset	N/A	DC2	6–29
Delete	N/A	DEL	6–30
Download a Language	SFCC V	ESC V	6–31
Elongated (Double High) Print (1 line)	SFCC h	ESC h	6–33
	BS		
Emphasized Print	SFCC E	ESC E	6–34

Alphabetical By Function (continued)

Function	P–Series	Serial	Page
Emphasized Print Reset	SFCC F	ESC F	6–35
Expanded (Double Wide) Print	SFCC W	ESC W	6–36
Expanded (Double Wide) Print Reset	SFCC W	DC4 ESC W	6–36
Expanded (Double Wide) Print (1 line)	SFCC k	SO ESC SO	6–37
Extended Character Set	SO SFCC SO SFCC n SFCC 4	ESC 4	6–38
Extended Character Set Cancel	SI SFCC SI SFCC o SFCC 5	ESC 5	6–39
Form Feed	FF	FF	6–40
Forms Length Set (Inches)	SFCC INCHES	ESC C NUL	6–41
Forms Length Set (Lines)	SFCC LINES	ESC C	6–42
Horizontal Tab	N/A	HT	6–43
Horizontal Tab Set	N/A	ESC D	6–44
Line Feed	LF	LF	6–45
Line Feed n/216 Inch (1 line only)	N/A	ESC J	6–46
Line Spacing 1/6 Inch (6 lpi)	SFCC 2 SFCC LPI	ESC 2	6–47
Line Spacing 1/8 Inch (8 lpi)	SFCC 0 SFCC LPI	ESC 0	6–48
Line Spacing 8 or 10.3 LPI (1 line only)	ACK SFCC f	N/A	6–49
Line Spacing 7/72 Inch	SFCC 1	ESC 1	6–50
Line Spacing n/72 Inch (as executed by ESC 2)	SFCC A	ESC A	6–51
Line Spacing n/216 Inch	SFCC 3	ESC 3	6–52
Overscoring	SFCC _	ESC _	6–53
Plot, Even Dot	EOT SFCC d	N/A	6–54
Plot, Odd Dot	ENQ SFCC e	N/A	6–55
Print Mode/Pitch Selection	SFCC X SFCC PMODE	ESC X	6–57
Print Mode/Pitch Selection (MVP)	SFCC [	ESC [	6–59
Printer Reset	SFCC @	ESC @	6–56
Printer Select	N/A	DC1	6–60
Printer Deselect	N/A	DC3	6–61
Skip–Over Perforation	N/A	ESC N	6–62
Skip–Over Perforation Cancel	N/A	ESC O	6–63
Superscript/Subscript Printing	SFCC S	ESC S	6–64
Superscript/Subscript Printing Reset	SFCC T	ESC T	6–65

Alphabetical By Function (continued)

Function	P–Series	Serial	Page
Underline	SFCC –	ESC –	6–66
VFU Commands (P–Series)	DLE–US	N/A	6–67
Vertical Tab	VT	VT	6–68
Vertical Tab Set/Clear (Serial Matrix)	N/A	ESC B	6–69

Alphabetical By P–Series Code

P–Series Code	Function	Page
ACK	Line Spacing 8 or 10.3 LPI (one line only)	6–49
BEL	Bell	6–8
BS	Backspace	6–7
BS	Elongated (Double High) Print (1 line only)	6–33
CR	Carriage Return	6–16
DLE–US	VFU Commands	6–67
ENQ	Plot, Odd Dot	6–55
EOT	Plot, Even Dot	6–54
FF	Form Feed	6–40
LF	Line Feed	6–45
SO	Extended Character Set	6–38
SI	Extended Character Set Cancel	6–39
SFCC @	Printer Reset	6–56
SFCC –	Underline	6–66
SFCC _	Overscoring	6–53
SFCC [	Print Mode/Pitch Selection (MVP)	6–59
SFCC d	Plot, Even Dot (high density)	6–54
SFCC e	Plot, Odd Dot	6–55
SFCC f	Line Spacing 8 LPI (1 line only)	6–49
SFCC j	Bold Print (1 line only)	6–13
SFCC k	Expanded (Double Wide) Print (1 line only)	6–37
SFCC l	Character Set Select	6–19
SFCC n	Extended Character Set	6–38
SFCC o	Extended Character Set (Cancel)	6–39
SFCC 0	Line Spacing 1/8 Inch (8 lpi)	6–48
SFCC 1	Line Spacing 7/72 Inch	6–50
SFCC 2	Line Spacing 1/6 Inch (6 lpi)	6–47
SFCC 3	Line Spacing n/216 Inch	6–52
SFCC 4	Extended Character Set	6–38
SFCC 5	Extended Character Set (Cancel)	6–39
SFCC 6	Character Set Select (Printable Symbols)	6–23
SFCC 7	Character Set Select (Control Codes)	6–22
SFCC h	Elongated (Double High) Print (1 line)	6–33
SFCC A	Line Spacing n/72 Inch	6–51
SFCC E	Emphasized Print	6–34

Alphabetical By P–Series Code (continued)

P–Series Code	Function	Page
SFCC F	Emphasized Print Reset	6–35
SFCC G	Bold Print	6–13
SFCC H	Bold Print Reset	6–14
SFCC INCHES	Forms Length Set (Inches)	6–41
SFCC LINES	Forms Length Set (Lines)	6–42
SFCC LPI	Line Spacing 1/6 Inch (6 lpi)	6–47
SFCC LPI	Line Spacing 1/8 Inch (8 lpi)	6–48
SFCC OSET	Character Set Select: Extended (ECMA)	6–27
SFCC PMODE	Print Mode/Pitch Selection	6–57
SFCC PSET	Character Set Select: International	6–25
SFCC R	Character Set Select: International	6–25
SFCC S	Superscript/Subscript Printing	6–64
SFCC SO	Extended Character Set	6–38
SFCC SI	Extended Character Set Cancel	6–39
SFCC T	Superscript/Subscript Printing Reset	6–65
SFCC V	Download a Language	6–31
SFCC W	Expanded (Double Wide) Print and Reset	6–36
SFCC X	Print Mode/Pitch Selection	6–57
VT	Vertical Tab	6–68

Alphabetical By Serial Matrix Code

Serial Code	Function	Page
BEL	Bell	6–8
BS	Backspace	6–7
CAN	Cancel	6–15
CR	Carriage Return	6–16
DC1	Printer Select	6–60
DC2	Condensed Print Reset	6–29
DC3	Printer Deselect	6–61
DC4	Expanded (Double Wide) Print Reset	6–36
DEL	Delete	6–30
FF	Form Feed	6–40
HT	Horizontal Tab	6–43
LF	Line Feed	6–45
SI	Condensed Print	6–28
SO	Expanded (Double Wide) Print (1 line only)	6–37
ESC :	Character Pitch 12 CPI	6–18
ESC @	Printer Reset	6–56
ESC –	Underline	6–66
ESC _	Overscoring	6–53
ESC [	Print Mode/Pitch Selection (MVP)	6–59
ESC 0	Line Spacing 1/8 Inch (8 lpi)	6–48

Alphabetical By Serial Matrix Code (continued)

Serial Code	Function	Page
ESC 1	Line Spacing 7/72 Inch	6–50
ESC 2	Line Spacing n/72 Inch (as set by ESC A)	6–51
ESC 2	Line Spacing 1/6 Inch	6–47
ESC 3	Line Spacing n/216 Inch	6–52
ESC 4	Extended Character Set	6–38
ESC 5	Extended Character Set Cancel	6–39
ESC 6	Character Set Select (Printable Symbols)	6–23
ESC 7	Character Set Select (Control Codes)	6–22
ESC h	Elongated (Double High) Print (1 line only)	6–33
ESC l	Character Set Select	6–19
ESC u	Character Set Select (Printable Symbols)	6–24
ESC A	Line Spacing n/72 Inch (as executed by ESC 2)	6–51
ESC B	Vertical Tab Set/Clear (Serial Matrix)	6–69
ESC C	Forms Length Set (Lines)	6–42
ESC C NUL	Forms Length Set (Inches)	6–41
ESC D	Horizontal Tab Set	6–44
ESC E	Emphasized Print	6–34
ESC F	Emphasized Print Reset	6–35
ESC G	Bold Print	6–13
ESC H	Bold Print Reset	6–14
ESC J	Line Feed n/216 Inch (1 line only)	6–46
ESC K	Bit Image Mode, Single Density	6–9
ESC L	Bit Image Mode, Double Density	6–10
ESC M	Character Pitch 12 cpi	6–18
ESC N	Skip–Over Perforation	6–62
ESC O	Skip–Over Perforation Cancel	6–63
ESC P	Character Pitch 10 cpi	6–17
ESC R	Character Set Select: International	6–25
ESC S	Superscript/Subscript Printing	6–64
ESC SI	Condensed Print	6–28
ESC SO	Expanded (Double Wide) Print (1 line only)	6–37
ESC T	Superscript/Subscript Printing Reset	6–65
ESC V	Download a Language	6–31
ESC W	Expanded (Double Wide) Print	6–36
ESC X	Print Mode/Pitch Selection	6–57
ESC Y	Bit Image Mode, Dbl Density Dbl Speed	6–11
ESC Z	Bit Image Mode, Quadruple Density	6–12
VT	Vertical Tab	6–68

INDEX

A

B

C

C *(continued)*

D

E

F

G

P *(continued)*

R

S

S *(continued)*

T

U

V

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